AMERICAN MACHINIST

A JOURNAL FOR MACHINISTS, ENGINEERS, FOUNDERS, BOILER MAKERS, PATTERN MAKERS AND BLACKSMITHS.

VOL. 8, No. 13. WEEKLY. | NEW YORK, MARCH 28, 1885. | $2.50 per Annum. SINGLE COPIES, 5 CENTS.

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ENTERED AT POST OFFICE, NEW YORK, AS SECOND CLASS MATTER.

Dickson Locomotives.

On this page and the next we give perspective views of three locomotives, showing the latest style of engines built by the Dickson Manufacturing Company at Scranton, Pa., under the superintendence of Mr. John Devine. These locomotives embrace all the latest improvements in locomotive construction. While likely to be very efficient in doing their work, the locomotives are built in a way that is certain to secure durability in service and freedom from breakage, the parts being well fitted, of good material and having a good margin of safety.

The first engine is a development of the Forney locomotive that has done such good service for light suburban and elevated railroad business. This engine is designed for heavy traffic on short runs, and will be found highly efficient for branch service or for handling heavy freight trains in the neighborhood of cities.

Fig. 2 shows the Standard Mogul locomotive of the largest size built by the company. The engine in working order weighs 86,000 pounds, 74,000 pounds resting on the drivers and 12,000 pounds on the pony truck. The cylinders are 19x24 inches, and the driving wheels are 54 inches diameter. This gives 160 pounds tractive power for every pound of effective pressure upon the piston. As the weight on the wheels is sufficient to prevent slipping under any but the most unusual circumstances the engine will be found capable of pulling a very heavy train. She is rated to haul 1795 tons on a level, but that would be a light load for the engine.

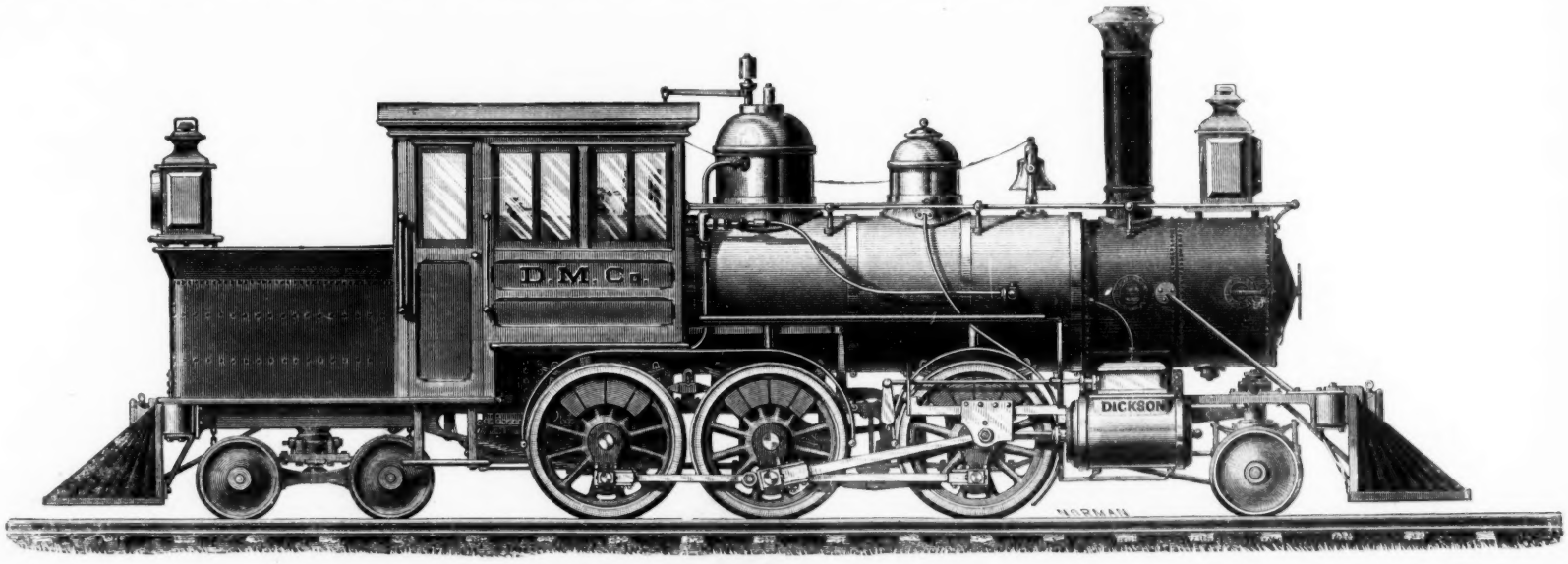


FIG. 1.—LOCOMOTIVE OF THE FORNEY TYPE.

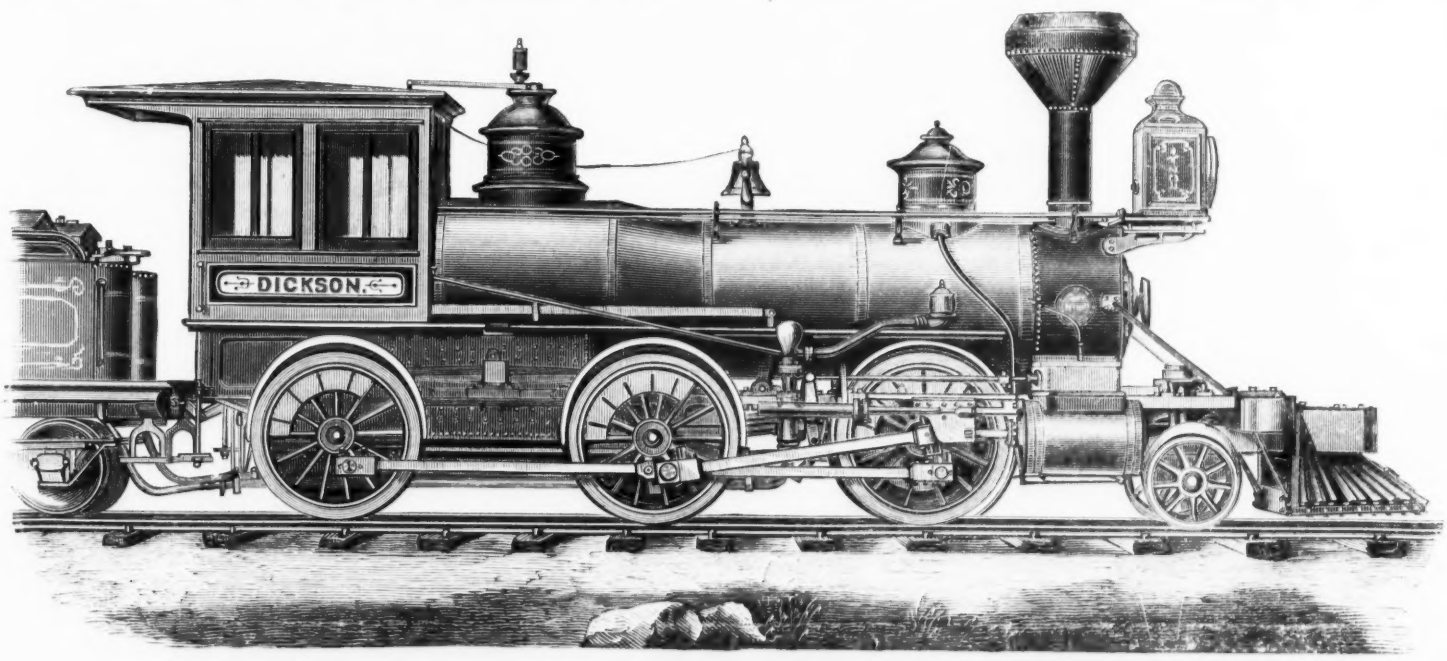


FIG 2.—DICKSON MOGUL LOCOMOTIVE.

Fig. 3 is the Standard Consolidation locomotive built by the Dickson Manufacturing Company. This engine is heavier than the Mogul, but the additional pair of wheels gives a good distribution of weight. The dimensions of working parts are not materially different from those of the mogul. These engines are all constructed from standard templates and gauges, and the guarantee is given that the work is interchangeable. The company claim that having considerable experience in repairing locomotives for railroads in the vicinity of Scranton has given them excellent opportunities for discovering the parts most likely to require renewing and repairing, and this knowledge has been used in the new designs to make the parts stronger and more durable.

Artesian Wells in Georgia.

Artesian wells seem to be engaging the attention of small Georgia towns. Albany has nearly a dozen flowing wells, from 500 to 800 feet deep. Montezuma has a very large one. Quitman, Camilla, Waycross, Smithville, Atlanta and other towns are now boring. The Atlanta well is now over 1,400 feet deep, and there is yet no prospect of flowing water, though the well is nearly full of mineral water. Thomasville, Bainbridge and Americus have bored deep wells, and not being able to find water that would flow of its own accord, they are pumping from depths ranging from 100 to 300 feet. The supply of water seems to be practically inexhaustible, but some simpler and cheaper method of pumping is very much wanted. These wells were bored with the Pennsylvania oil well rig, and now they are being pumped by attaching sucker rods to the end of the working beam, and operating single-action pump cylinders down in the well. The one in Thomasville is 1,900 feet deep, and the water, which possesses valuable medicinal properties, is within 210 feet of the surface. It is being supplied through small pipes to the principal hotels and to the city cisterns.

We note by cable despatches that Under Secretary Fowler, of the British Government, has written to his constituents at Wolverhampton defending the Government in their action of purchasing American steam pumps for Suakim-Berber waterpipe line. Mr. Fowler states that his Government procured American pumps because of the experience of the American firm furnishing them in putting up pumps for this trying service, and also because the pumps were in stock, and time was thus saved in making deliveries. We happen to know that, while the first reason

was correct, but *one* of the pumps was in stock, the others were to be made after the contract was closed. It was indeed a question of deliveries, and, with the odds of transit across the ocean, the American firm made the deliveries inside the contract time. A cablegram was sent the British Government on Saturday, March 7, notifying shipment of the last pumps of the first contract per Adriatic steamer Republic.

New Men.

By S. W. Goodyear.

I have been thinking over old shop experiences, and among all the strange things which come vividly to my mind in looking back over nearly forty years of shop life, more than two-thirds of which time has been spent in superintending the building and operating of machinery, there is nothing more strange than the surprising differences in capacity and efficiency of new men. I once hired two men on the same day, one of whom represented himself to be a machinist, while the other said he knew nothing about machine work, but was anxious to learn, and would gladly accept the position which had just been vacated by a man who had oiled up, swept out, and made himself generally useful at $1.25 per day, provided I would occasionally give him a job of machine work to do. "But," said I, "you can't afford to do that; don't you get twice that where you now work, and can't you stay there if you choose?" His answer was: "Yes, and can get quite a raise probably to stay, but I want to learn to do machine work, and am bound to do it if I have to work for nothing and board myself." He got the job, and within a week another cheap man was hired to take his place, while he was, to all intents and purposes, a jour machinist for the two years or thereabouts, in which he proved himself one of the best men in the shop. Anxious to learn, he not only learned by direct instruction and practice, but by closely observing the practices of others, and, with the sound judgment of mature years, after much experience in operating first-class machinery, he often surprised some of the best men in the shop by improving upon their methods in spite of the fact that they had served a regular apprenticeship, and had been counted for years first-class workmen.

During the time this man was in my employ his wages were raised several times, until, when he proposed to quit, he was getting full wages for good men. A further raise would not keep him. Not long after he left me I learned his motive for what had seemed a strange course. As partner in a new company formed to manufacture the same class of goods on which he had worked before coming to me, he had assumed the position of machinist, tool-maker and mechanical superintendent. He is still in the same line of business, and, from being able to build any machinery, or make any tools needed, as well as to operate them in the best possible manner, he is acknowledged to be the rightful head of the concern in a mechanical sense.

But about the skilled machinist whom I hired on the same day at full wages: He was the worst sort of botch, with apparently but one motive, *i. e*, that of getting through each day as easily as possible. Much of the work which he undertook found its way into the scrap heap, while of that which was accepted scarcely any of it was up to the standard of good work. Changing him from one job to another, in the vain hope that in some direction he would prove successful, I finally discharged him. Years afterward I met him in the capacity of commercial traveller for a large manufacturing concern. He laughingly referred to his experience as a machinist, saying that he was never made up right for such monotonous, routine work; never took any interest in it, beyond having the time pass and getting his wages, and finally concluded to give it up. "But," said he, "I have found my place now; I get good pay, like the business, my employers are satisfied with me, and I often wonder that I should have tried so long to get a living at machine work."

M. Quad, in the Detroit *Free Press*, says some good things to aspirants for honors through the professional channels; but, in reading his advice to young men not to be discouraged because they cannot make good lawyers, etc., with his statements that he knew "a machinist who first studied medicine, a watchmaker who tried to become a lawyer, a carpenter who threw away three years of his life trying to become a dentist," I am reminded that I know a doctor with a large practice, a very enviable reputation as a physician, and who has at the same time made his mark as a historian, but could not learn, in the machine shop where he was placed by his father—himself a doctor—to learn a trade when in his teens, enough to be anything but a nuisance in the shop, and was called by all hands and the boss a regular lunkhead; so there are those who don't know enough to be mechanics who make professional men.

I know a first-class business manager, whose wealth may be counted by the hundreds of thousands of dollars, possibly by the million, who was a moulder when I first knew him, and a good one, too, who can do it yet, and occasionally finds time to help the boys out of a tight place, and still manages the large manufacturing establishment, employing hundreds of men, of which he is the head, looking well after his many outside investments, and responding cheerfully to calls upon his time in matters of politics, as a legislator, if need be, in outside business matters as director, and socially as one of the most genial and approachable of men. Why did he not remain simply a moulder at day wages? Why does a cork swim?

I knew a highly-educated mechanical engineer, who, after graduating, donned the blue overalls, and rolling up his sleeves, served an apprenticeship in a machine shop. Does some one say: "Another case of mistaken calling; not fit for an engineer, but good enough for a machinist." Let us see. There was a demand for a difficult feat in engineering, which all the supposed best authorities to whom it was submitted pronounced impossible, till it reached this man of the shop, as well as of the college, who said: "It can be done; put it in my hands to do, and I will guarantee entire success." It was done, and has helped to swell the record of difficult bridge engineering successfully accomplished in a way to make the name of our friend of the practical "know how" immortal.

M. Quad has said some capital things in the letter referred to. "The machinist who stands at his lathe to do about so much work in ten hours need not hope to be better off. It is the men who put their heart into the work they do who succeed." * * * "Don't be satisfied with $2 per day. Make yourself worth $3." Good! Good! But don't let us feel that our positions as mechanics are one whit inferior to those occupied by gentlemen of the learned professions. True, it may be that many mechanics would succeed in no other calling, but it is not less true that they are accomplishing daily—judged from a purely mental, close-thinking standpoint—that which some of the most highly-educated professional men could never learn to do. How is it possible to judge in advance of the possibilities locked up in the brain of the new beginner? "Won't it shrink to it?" asked John, the butt of the shop, when, having been told to shrink some small pulleys on to their respective shafts, and how much to allow for shrinkage, he had shown the first one to the boss to see if it was right, after having carefully turned the shaft $\frac{1}{64}''$ smaller than the hole. John did not hear the last of this for a long time, but he made one of the best of workmen.

There are the close workmen, who can't figure out anything, who can stay in a machine shop as lathe hands all their lives, and make the lathe cut all the different threads laid down on the index, but never have any idea how the facts that certain combinations of gears cut certain threads were arrived at, and, if the index should be lost, their only way out would be to cut and try or ask for help, and still some of these men are capital workmen.

There are the men who figure out everything, telling you that such a piece must be so many inches, and such a fraction expressed in decimals as would call for measuring within one-millionth of an inch, and, if you give them the job to do, they can't work within $\frac{1}{32}''$ and never make a fit except by accident.

I once hired a great, strapping, good-looking fellow, six feet high, who would tip the scales at about two hundred pounds, and had learned his trade at the shop of "Close Work & Co.," after which he had remained in their employ some five or six years. This settled it. Of course I had secured a prize. I gave him for his first job some pieces of tool steel $2\frac{1}{4}''$ wide by $1\frac{9}{16}''$ thick, through which holes were to be turned in the direction of the width $1\frac{9}{16}''$ diameter, which size of hole would just cut the pieces in two, only for the pressing out of the stock at the sides. This was a job which had been done very satisfactorily over and over on the 14" Pratt & Whitney lathe, which went into the hands of my new man with hardly a scratch or bruise from its two years' service. A new experience that lathe had, and during the first day got more bruises than for the entire two years before. The pieces were hammered and knocked to place, and home to the face-plate, with blows which endangered the lathe head, and when the turning was done nuts were unscrewed, and pieces with the blockings all tumbled to the floor in promiscuous order, regardless of the damage to ways or carriage. Tools were removed, changed, ground and reground for each hole. That the tool which had just finished a hole to the right size must be set right for the next hole, and, through the agency of the thread gauge on the carriage, could be brought to the same position for the last chip in the next hole, did not occur to my new man; he went by the cut-and-try plan. His first half day was put in by alternating between the engine lathe and a hand lathe, where he was converting a piece of large-sized drill rod into a ferrule for the ground end of a cane. With this done the young man seemed tired, and, taking my toolboard, which, furnished with ribs to set between the ways, and well loaded with tools, I considered very useful, not simply to keep tools conveniently at hand and in good order, but as affording protection to lathe shears as well, he poured its contents in a promiscuous heap on the floor, and, replacing the board on the lathe, seated himself on it, where, swinging his legs back and forth, he seemed a very picture of stalwart masculine contentment, until it suddenly occurred to him that the belt needed tightening, and full three inches was taken out, although the well-stretched belt was as tight as necessary before.

Some two hours after this I discovered my muscular prize assisting the tight lathe belt with his hand, shortly after which he found the cone stuck on the spindle, and proceeded to remove the caps and take out the spindle. After much hammering and bruising the screw gear was removed, the cone taken off, the abraded bearing surfaces smoothed up, and, being put together again, an attempt was made to put the spindle in its place. It would not go in. After several trials, from which it was evident that something was wrong, the spindle was laid on the floor, and with much deliberation my new man proceeded to make room for the apparently too lengthy spindle by filing off the boxes. Just here I interfered. "But it

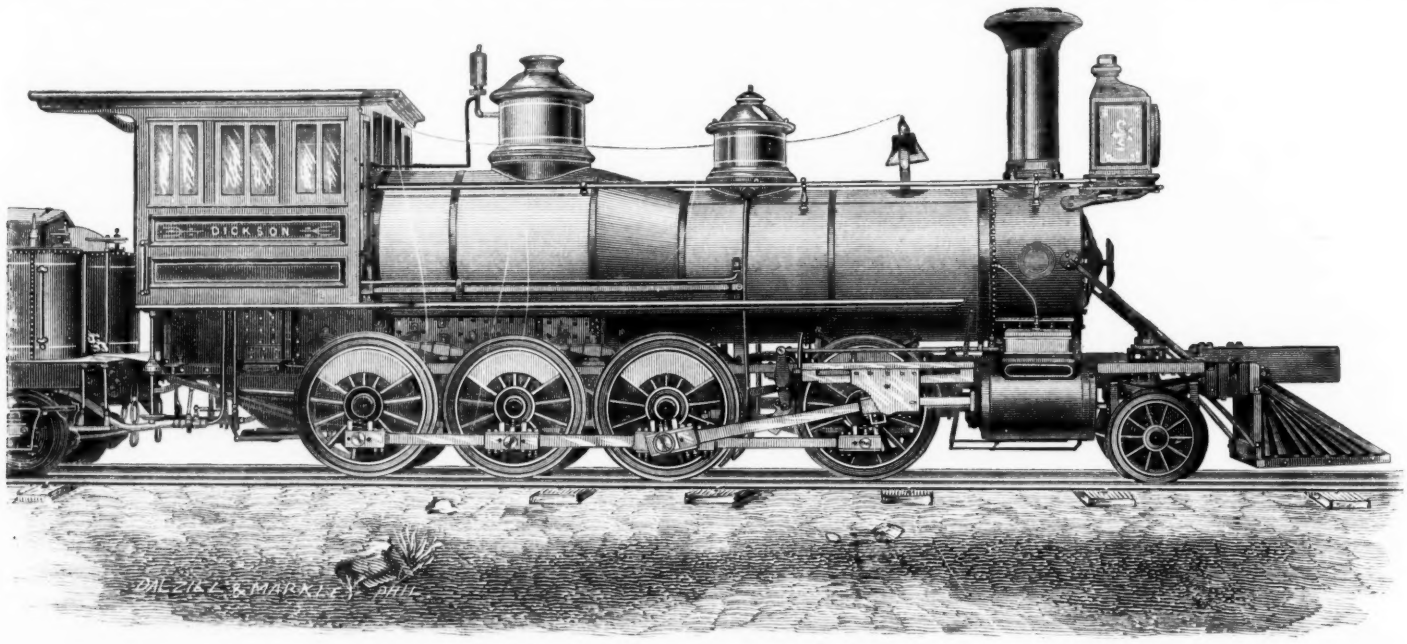


Fig. 3.—Standard Consolidation Locomotive.

won't go in; I've got to do something with it," said he. Said I: "That spindle has been running for the past two years; you just took it out, and you ought to know that it will go back again without any filing; let's find out where the trouble is. It was very simple. In pounding at the screw gear on the back end of the spindle, he had started the gear at the front end back from the shoulder, so that the face of the screw gear in the position in which he had keyed it on brought up on the inside of the back box. It was fixed all right in a few minutes without filing, but it was a narrow escape, and furnished the key to my new man's character as a mechanic. *He did not think.*

I afterwards gave him some work to do on a small shaper, which was to be held in the chuck or vise. The blows with which each piece was treated to bring it down were enough to demoralize the foundation for a ten-ton steam hammer. Some pieces of about 1½″ square by 2″ long he set up endwise in the chuck in a row, with a parallel piece an inch thick under them, for the purpose of planing off the ends, and when they were tipped over by the pressure of the tool, he saw no remedy except to screw up tighter, until I asked him why he did not take the parallel piece out, and, letting the pieces drop down to the chuck, get a hold which would stand the pressure? "That's a fact. I wonder why I didn't think of it," said he.

I tried him on close measurements, by giving him several pieces to make of exactly the same length and size, so that they would be a driving fit into a flat-bottomed countersunk hole, and when driven home come just flush with the face of the piece to which they were fitted. Within a small fraction of .001″ was a necessity. Not one of them came within .001″ either in size or length, and some of them varied as much as .008″ by actual measurement, from the sample. Two or three months finished this man's service with me. He thanked me over and over for trying to teach him to think. Said he: "I have always been told to do things thus and so, and scolded if I did not do right; but, somehow, nobody seemed to care whether I knew why I was to do as I was told." I helped him to get a job where coarse, heavy work was done, at which he got the name of being a good man; while I filled his place with an eighteen-year-old boy, whom I had hired to do odd jobs about the shop, and who learned in a few weeks to do the work—which four or five years of apprenticeship and more years of practice as a jour, had left Close Work & Co.'s man incompetent to do even passably well—so well as to be above criticism.

The boy had learned nothing previously to stand in the way of adopting right methods. The man, however willing to learn to do right, had learned so many wrong things, which he could not unlearn or forget, as to continually lead him astray.

There are lathe hands who always have their centers true and of proper shape, with all work turned on them having centers drilled and reamed to fit. There are others who do not hesitate to dispense with center drilling on light work, making a prick punch mark do; or, if the center is drilled, it is either not countersunk at all, or, if done, the angle does not fit that of the lathe centers. Such men are continually a drag on any concern by whom they are employed, both in the direction of character of work and economy, besides their slouchy methods with lathe centers extending to everything which they do.

Little things show the character so well, that old practical fellows can't be made to believe that the man who takes extra pains to have his lathe centers true, and of proper angle, with the centers in a piece which he is to turn—a roll, for instance—of exactly the same angle, with the drilling deep enough to not bottom will go on and turn the piece up to a finish at one chip over, without squaring up the ends. *No, sir!* He knows that such treatment could not make the piece round, true, straight, or of uniform size for its entire length, and that, with the centers deeper at one side than the other, they will shift before he gets through; and that there is always strain enough in rough work to spring it out of true on removing the roughing chip; and if he has used the lathe any great length of time, he will have learned just where to set it to turn straight; while, if he has not, you won't catch him fooling much time starting a chip and letting it run till he can tell whether it is going to turn straight by calipering. He will turn a place at the end of the size which he proposes to have the roughing chip leave, and, changing ends with the piece, he will see if the tool in the same position in which it did the turning will touch the turned end when on the live center, and if it don't he will reset the tail-block so that either end first, whether on the live center or on the dead one, the tool shall touch this turned place just the same.

I wonder if somebody has ever tried turning the straight part of his lathe centers between the point and the tapered part which fits in the spindle to an exact size, and fitted to them a roll with about the same nicety as characterizes the fit of a cylindrical size gauge on its template, according to Pratt & Whitney's, the roll having its periphery turned perfectly concentric with the hole, and then bringing the tool carefully up to the roll when on the live center, with the thumb and finger, aided by the eye, seeing *just* when the tool *just* touches, and then shifting the roll to the dead center, and coaxing the tail spindle into exactly the position where the tool shall touch the roll *just* as it did when on the live center? I wonder if anybody ever did, and whether, if they did, this way of setting a lathe to turn straight did not beat the plan of turning along an inch or two, and guessing with the calipers how much to set over, and then setting it over at a guess?

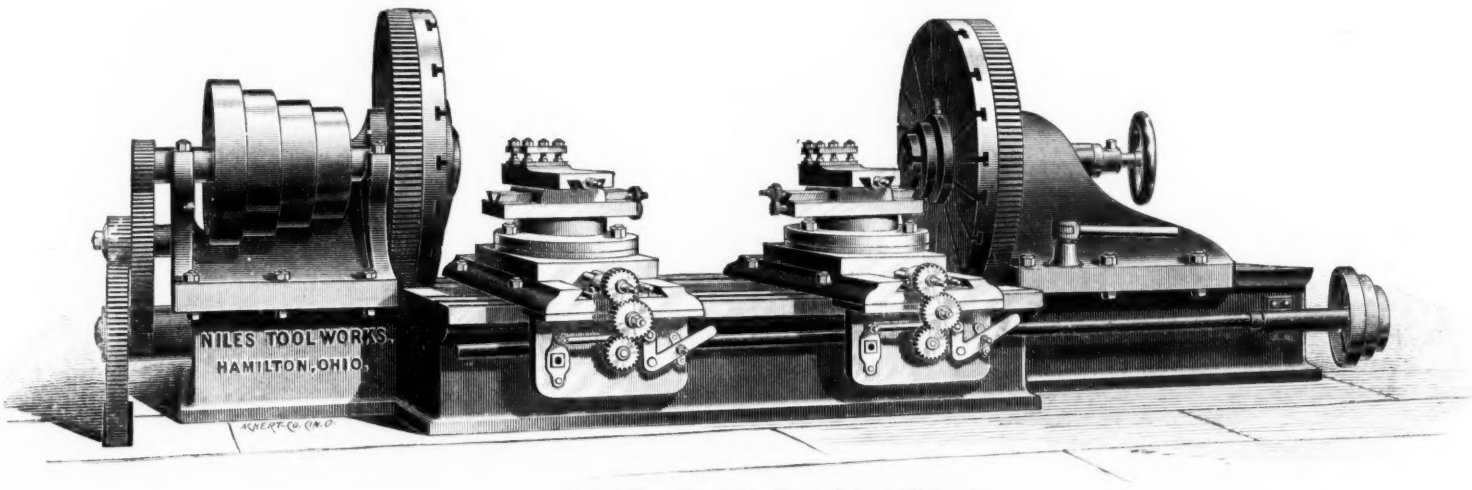
A correspondent writes us that if those having soldering to do will try "star candle," for soldering copper, tin, zinc, lead, or any compositions of these metals, they will never use rosin again. "Star-candle" we suppose to be some popular brand of candles. Tallow is very frequently used as a flux for soldering, but perhaps the candles referred to possess some additional valuable qualities.

Lathe for Turning Steel-Tired Wheels.

We illustrate herewith a new double-head wheel lathe, built by the Niles Tool Works, Hamilton, Ohio. It is designed more especially for turning steel-tired wheels.

The extended use of steel-tired wheels demands special appliances for truing them up. They may be turned in a driving-wheel lathe, but such a machine cannot be spared for other than its more legitimate work, and when used for this work it is found too slow in its operations to do the work with good economy. This machine seems to have been designed with care to meet the requirements.

The special features in the construction of this lathe are the arrangements of heads and face-plates in such a manner that the wheels are brought up close to the face-plates, and the provision for turning wheels with the axles carried on their journals. By bringing the wheels and face-plates close together, short and stiff drivers may be used, and means may be employed for securing both together so as to drive with great steadiness. Carrying the axles on their journals enables the machine to carry very heavy cuts without flinching. It is designed, by this means, to carry out the principle adopted for roll turning, broad tools being used. Wheels carried on centers could not stand the enormous thrust of such a cut. To do this work a machine of great strength and power is required.



Lathe for Turning Steel-Tired Wheels.

Each head is provided with a central steel sliding spindle with centers. When carrying the axles on their journals, these centers are capped and act as thrust bearings to prevent end motion of the axle. When required, they are used as centers, and wheels may be turned as in an ordinary lathe. This provision permits the turning of truck wheels with journals between the wheels.

The right-hand head is movable by quick-hand motion through a rack and pinion. The carriages have compound rests. These rests have power feed for both the upper and lower slides, so arranged that they can be instantly reversed. The feeds are driven positively by slip gears. The driving cone has four steps for a five-inch belt, giving a sufficient variation of speed for all sizes of car wheels. The gearing throughout is accurately cut from the solid.

We are informed that with this lathe from four to six pairs of 42-inch wheels can be trued up in 10 hours.

Statistics of the British Iron Trade Association show that the production of pig iron throughout that country was 7,528,000 tons in 1884 being a decline of 961,000 tons or 11 per cent. on the quantity made in the preceding year. This is the largest decline that has ever occurred in any one year in the history of the British iron trade.

The longest bridge in the world crosses Lake Ponchartrain, near New Orleans, and is twenty-two miles in length. It is trestle work on piles, and is made of cypress wood, which was first saturated with creosote oil, which renders it impervious to moisture and proof against the attack of barnacles.

An Ancient Brake Device Rejuvenated.

The railroad companies of the American Continent are having their attention persistently directed to what is represented to be a new and valuable improvement on the car brake. This is not an automatic, continuous brake improvement, but is an invention, which professes to elevate the utility and dignity of the humble hand-brake of passenger and freight cars by providing a substitute for the familiar ratchet, pawl and chain. These attachments of the brake are now to be abolished, and a simple screw substituted in their place. There is nothing surprising in the proposal to operate a hand-brake by means of threading the end of the staff, but that an inventor was able to cover the contrivance with a patent was indeed astonishing. The threaded staff is used as much on the brakes of European rolling stock, as the ratchet and chain is on this side, and that has been the plan followed there for fifty years. The plan has some advantages over the ratchet and chain, but it also has grave drawbacks which we believe will prevent its general adoption in this country. The screw is simple and does away with several parts; but to work fairly it has to be kept oiled, and even then, so much sand gets into the nut that the thread is rapidly cut and generally gives out when most wanted. This makes the brake useless till the piece having the ruptured thread is replaced so that in practice the cost of repairs is heavy. But should any master mechanic wish to try a brake of this kind he will find numerous methods of its application in Clark's Railway Machinery, and in Colburn's Locomotive Engineering. If he adopts the designs shown in these works, it will be hard for any patentees to interfere with his brake.

The Pennsylvania Railroad Company are experimenting with lighting their cars by means of electricity carried in storage batteries. They use the lights on a train running between Altoona and Pittsburgh, and the arrangement has worked satisfactorily. The storage batteries are charged in the companies shops by connection with a dynamo electric machine. It takes about nine hours running to charge the batteries with sufficient electricity for the round trip. The intention is, should the plan be found advisable for general use on the through trains to establish electric plant at different stations for charging the batteries. The batteries are quite easily kindled and can be changed without any trouble.

From Mr. W. A. Thompson, assistant superintendent and master mechanic of the Marquette, Houghton and Ontanagon Railroad, which runs through northern Michigan, we learn that his road has got very comfortably through the severe winter, considering the terrible difficulties encountered operating railroads through the snows of that boreal region. Mr. Thompson has had extended experience in overcoming these difficulties. Every locomotive is equipped with the best known devices for flangeing and keeping the track from getting gradually blocked up with snow, and the men have shown great energy and intelligence in helping to keep the road open.

The Trouble with the Philadelphia Traction Company's Road.

BY W. BARNET LE VAN.

The Columbia Avenue branch of the cable road of the above company has discontinued the running of its cars by the cable until next spring, from the fact that "Jack Frost" made serious objection by closing the slot at intervals so as not to allow the passage of the grip.

The whole trouble is due to the *form, construction* and *material* of the conduit laid.

Fig. 1 is a section of the conduit as laid on Columbia Avenue, Market, Franklin, Seventh, Ninth and Spring Garden Streets, which has cost a large sum of money.

Fig. 2 is a sketch of "the remedy proposed."

This idea is being carried out near the depot at Twenty-third Street and Columbia Avenue, "and, though the section upon which the plan was tried was submitted to a severe test in the wide ranges in temperature during last week, the contraction in the coldest night is said to have been inappreciable. Engineers not in the employ of the company have pronounced the scheme a success;" so say those who are stockholders.

Cut Fig. 2 shows, in addition to Fig. 1, "yellow pine cross-ties, 3 feet 6 inches long, with a transverse section 5×7 inch, which

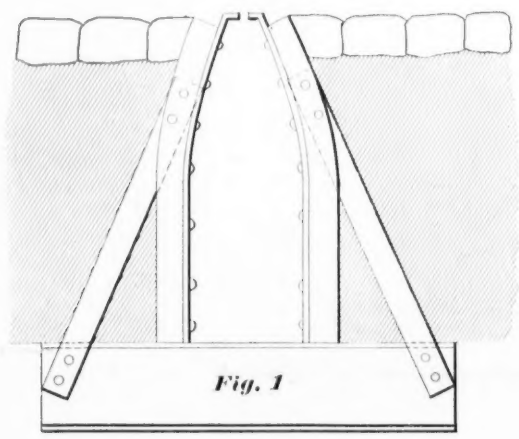


Fig. 1

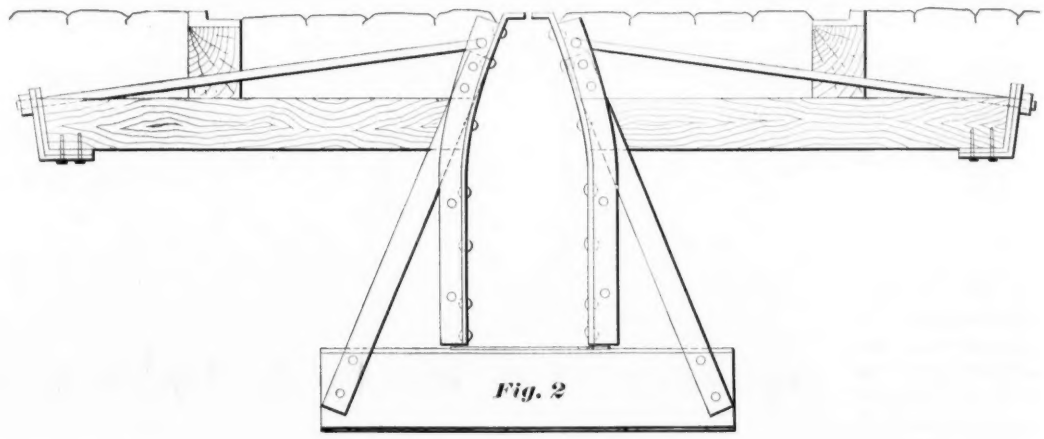


Fig. 2

are to be placed at intervals all along the line and on each side of the conduits. These timbers are to be placed about a foot below the plane of the slot, and extend below and beyond the sleepers of the track."

The Philadelphia *Inquirer* says:

That portion of the cross-tie extending from the side of the conduit to the sleeper will rest on the concrete bed surrounding the trench. The ties will be bolted firmly to the iron side braces, just above the point where the curve breaks towards the slot. Also running from the brace, but within a few inches from the slot, will be an iron rod, seven-eighths of an inch in diameter. This will extend at an angle to the outer end of the cross-tie below, where it will pass through an iron shoe and be held by a nut. The rod will pierce the sleeper on which the track is laid, and can be operated to either close or open the slot. This is accomplished by turning the nut at the end of the shoe. In order that this may be done easily, an arrangement has been devised whereby the conical block just above the shoe can be removed without difficulty, and a tool will be provided to readily adjust the rod in case of any great change in temperature. The cost of making these changes, it is said, will amount to something over $500 a mile. In pursuing the investigations of the trouble with the old system, Chief-Engineer Whitton and his assistants discovered that the principal cause of the closing of the slot was that water worked its way between and below the Belgian blocks, and, when subjected to lowering of temperature, forced the sides of the conduits together. It was found, however, that only a portion of the line would be thus affected at any particular time. While two-thirds of the route would be in perfect order, and no trouble would be experienced in the passage of the grip, it would probably be found that at some points in the other portion of the line the slot would be closed at intervals of perhaps forty feet. Rather than be annoyed by spasmodic cold snaps, the company concluded to discontinue operating the system until the spring, when the new braces will be laid, and no delays, it is said, will occur. Besides these stoppages, there are other causes for a temporary stoppage. The loss is said to have been fully $200 a day while the grip cars were running. Regular riders, anticipating delays and objecting to changing cars at Master Street, made use of other lines, perhaps just as convenient, until the road was operated as usual. Under these circumstances, it was concluded not to run the cable cars until a permanent remedy could be devised.

It is evident from the above that the form and material are elements of weakness. Wrought iron, it is well known, when placed in a position that will be alternately damp and dry, will corrode, and in time, by expansion, flake off and become reduced in thickness; in fact, when continually damp, this also takes place. This latter is well demonstrated in the wrought-iron water mains conveying the Croton water across High Bridge; when they are cleaned, thousands of pounds of iron is removed.

Independently of the materials, the conduit (Fig. 1) is defective in bracing, this latter being placed at such an angle as to defeat the very object it was intended to accomplish; in fact, they are *braces only in name, not in effect.*

The proper material for a conduit for the above purpose would be cast-iron, well ribbed on the outside at short intervals, which, for underground purposes, will generally maintain its thickness, and in a great many cases, when exposed to damp soil, become augmented in thickness, as in the case of many water mains.

As to the stability of cast-iron of this form, that is open on one, side to resist great pressure, it is best illustrated by the shearing and punching machine in every-day use, whose jaws are similar to the slot of the conduit. Fig. 3 will give an idea of such a conduit.

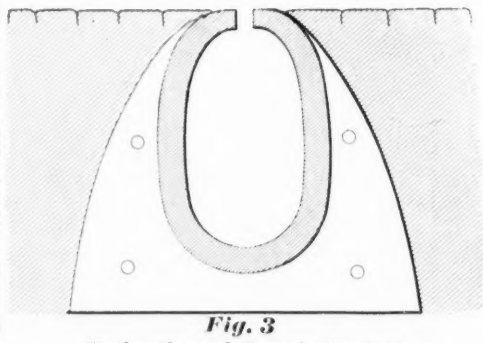


Fig. 3

Section through Crest in Conduit

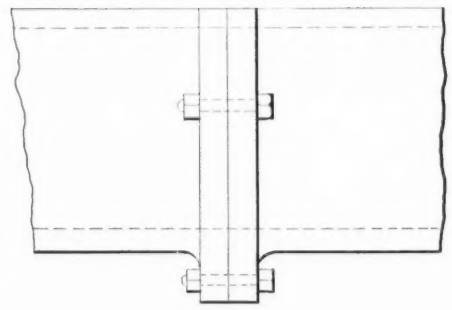


Fig. 4

The remedy proposed to obviate the difficulty with the present conduit, in my opinion, will not effectually cure the defect. The yellow pine cross-ties, 5×7 inches, will have to depend on the friction of the earth rammed against their sides, the value of which will be due to how carefully they are put in place; however well rammed when first placed in position, they will in time lose their value by becoming decomposed more or less, thereby lessening their hold.

Science and art, up to the present writing, have not been able to *circumvent* "Jack Frost" entirely in exposed places, such as open streets, where no protection is afforded.

The week's test at Twenty-third Street and Columbia Avenue is no argument nor test, as "Jack Frost" *has not had time enough to get his work in.*

Andy D. Howard, Bamberg, S. C., inquires about a machinist, Frank Munsey, from Ohio, who worked with him at Pensacola, Fla. Both left Pensacola about the same time. Mr. Howard requests Mr. Munsey to write him at Bamberg, S. C.

Blacksmith Shop at Renovo.

The blacksmith shop connected with the railroad works at Renovo, Pa., is famous all over the Pennsylvania Railroad system for the special tools and appliances in use for facilitating processes of iron-working and for cheapening the cost of repairs. The foreman of the shop, Mr. Green, is a most ingenious mechanic, and has devoted himself for years to the designing of formers and tools to aid in difficult jobs of forging. The result of his labors is a fine collection of tools that are used in connection with nearly every process of the shop. Processes of working metal, that were formerly thought only possible in small work, like what is used in armories and sewing machine shops, are here performed on a large scale on the heaviest parts of locomotives and cars, and the machine-made forgings are just as successful on a ponderous scale as they have been for years on small operations. Like those employed in the rest of the works, the men in this shop are employed entirely on piecework, and they receive all the aid that ingenious machines can give to hasten their operations. Under this impetus, iron changes its form with amazing rapidity. Many movements connected with machine forming and forging require the exercise of great personal exertion, but the work goes on incessantly, the men, in many instances, toiling as if their very existence depended on getting out so much work every hour. Rocker-arms are forged without any weld; and iron drawheads are also forged without a weld, and every part of the work is done under the steam hammer—a most difficult series of operations. Links, crossheads, valve yokes, in fact, all the wrought-iron parts of locomotives and cars are turned out expeditiously in perfect shape. It is the best equipped blacksmiths' shop we have ever seen, and the foreman is an enthusiast in perfecting the system.

The Worcester, Nashua & Rochester Railroad has recently received from the Rhode Island Locomotive Works what is reported to be the largest Mogul engine ever sent out from that establishment, and by all odds the largest engine ever seen in Worcester. Immediately upon its arrival at the engine house, work was begun to put it in order for a trial trip. The weight of the locomotive is 118,000 pounds: 103,000 on drivers, and 15,000 on truck. The cylinder is 18x24, with boiler 58 inches, and 354 flues two inches in diameter. The grate is 78x36 inches, the total wheel base of the engine is 22 feet 10 inches, driving wheel base 15 feet 2 inches, and total wheel base of engine and tender 46 feet 6 inches. The tank has a capacity of 3600 gallons, and the truck is of the two-wheeled radial pattern, with 33-inch wheels. The engine is supplied with Allen balanced valves and other patent attachments, to insure convenience and safety. It is numbered "22," and is to do heavy freight hauling over the steep grades of the road, and promises to be equal to most exacting service.

The *Ironmonger* says: It is reported that in view of the establishment at St. Petersburg and Warsaw of works for the production of agricultural implements, the Russian Government has resolved to introduce an import duty of 50 copecks (in gold) per pood on such articles, commencing on March 1. The duty-free importation of this class of machinery has recently assumed considerable proportions from England, Germany, and the United States.

The Boston *Journal* says: A young lady of seventeen, studying at one of our large educational institutions, is pursuing a course of study that half a century ago would have marked her as an extraordinary example of independence. She has chosen the course of mechanic arts, and takes shop practice, studies machinery and its necessary accompaniments of science and mathematics, and in all branches acquits herself to the satisfaction of her teacher. Her object in pursuing a calling considered usually fit only for the masculine intellect is to enable her to assist her father in his large manufactory at Rochester. At graduation she will be an accomplished machinist, a valuable member of the firm.

A Model Machinery Establishment.

The engraving on the following page represents the new works of J. S. Graham & Co., of Rochester, N. Y., who are widely known as builders of a high grade of wood-working machinery. It will be observed that the buildings are more ornate than usual for factory purposes. They are built in a substantial manner of brick on stone foundations, and are located on the corner of Lyell Avenue and West Street, and are reached from any part of the city by the Lyell Avenue street cars, which pass the works every few minutes.

The buildings are in the form of an "L," facing Lyell Avenue and West Street, running at a slight angle on the former.

The Lyell Avenue front is two stories high, and the "L" contains the offices, drawing room, etc., on the ground floor, and the pattern shop and loft on the second floor. The rest is one story in height, spanned by trusses of wood and iron, at intervals of eight feet, for the support of shafting and suspension railway.

The front door on the right leads to the general office, which is a large, commodious room, 22 feet long by 16 feet wide, and, like all the other rooms, is 13½ feet high. It is neatly furnished in ash throughout, including desk, lavatory, furniture, etc.

Adjoining the general office is the private office, a cosy room 16 by 13 feet, handsomely furnished, and reminds one of home

rather than a machine shop office. At the rear of the office is found the drawing room, an apartment 24 by 13 feet, and provided with light by four large windows facing the north—an advantage appreciated by draftsmen. This room is furnished with a fireproof vault of brick, 3½ feet square and 13½ feet high, for the reception and protection of drawings in case of fire. It is furnished with a case so arranged that any particular drawing of any of the numerous machines can be found at once.

The room next the drawing room is the supply room, in which are kept all the general supplies for shop, such as files, new tools, etc.

Entering the machine shop from the office, the eye is greeted by a large room, 180 feet long, 45 feet wide and 13½ feet high, without any obstructions in the form of columns or posts, and whose walls and ceilings are all whitened. The mechanical observer will notice many pleasant features, which, if not entirely new, are, to say the least, rare. The floor is made for durability; it is the proper distance from the ground to be on a level with the ordinary truck. The timbers supporting the floor are 12″ by 16″, resting on cut stone capped piers 12 feet from centers. On these timbers rest the joists, 16″ deep and 12″ from centers, and the floor proper is composed of 2″ plank, dressed to a thickness and spiked to the joist. On top of the plank is 1¼″ matched hard maple, making a very solid floor 3″ thick.

The window casings are 9 by 5 feet, with brick piers, 3 feet wide, between each window, each pier provided with a ventilating flue, 8″ by 8″, affording ample ventilation.

All the lathes and milling machines are placed on one side of the shop; drill presses, etc., in the center, and vise benches on the opposite side—a disposition giving the most room and convenience. The planers rest on large stone piers, thereby preventing vibration. On the lathe side of the shop is a narrow bench the whole length behind the lathes for the reception of lathe tools and other small tools, obviating the use of a toolboard on each lathe. Underneath this bench are located the steam pipes for heating. On the opposite side of the shop is a continuous vise bench, 120 feet long, built in the most approved manner, the bench legs, gas burners, etc., being made from new and special patterns. Underneath the vise bench is the steam pipe for this side of the shop.

In the center of the shop will be found the tool room. It is 16 feet long by 12 feet wide, wainscoted to about 4½ feet high, and has a paling of neat wire work 13″ high. In this room are kept all the general and portable tools of the shop, such as arbors, reamers, taps, dies, drills, dogs, templates, etc., none of which can be had without depositing a brass check, with which each workman is supplied, and which is returned to him when the tool is returned in as good condition as when taken away.

The line shafting is 2½ inches diameter, driven from the center, fitted with finished couplings of the flange pattern, and revolves in hangers that are adjustable in every direction, and have detachable bottoms; all pulleys are wrought rim *split* pulleys.

A large overhead railway of ample capacity extends the whole length of the building, and a six-ton machine can be taken from one end of the shop to the other and loaded on a truck in an incredibly short time by three men. This is found to be a great time and labor-saving convenience in the handling and moving of machinery. A full equipment of countershafting is located near the railway for the testing of all machines on actual work before shipment.

At the north end of the machine shop are located the blacksmith shop and casting cleaning room, both 32 by 33 feet. These departments are fitted with every convenience for the rapid performance of the various kinds of work, and are furnished with everything pertaining to comfort for the workmen. All large castings are easily handled by the overhead railway from the rear end to any part of the building.

On the east side of the cleaning room is a shed, 100 feet by 32 feet, in which are stored all the extra castings, lumber, oils, paints, etc., and it is also fitted with an overhead railway for the handling of heavy objects.

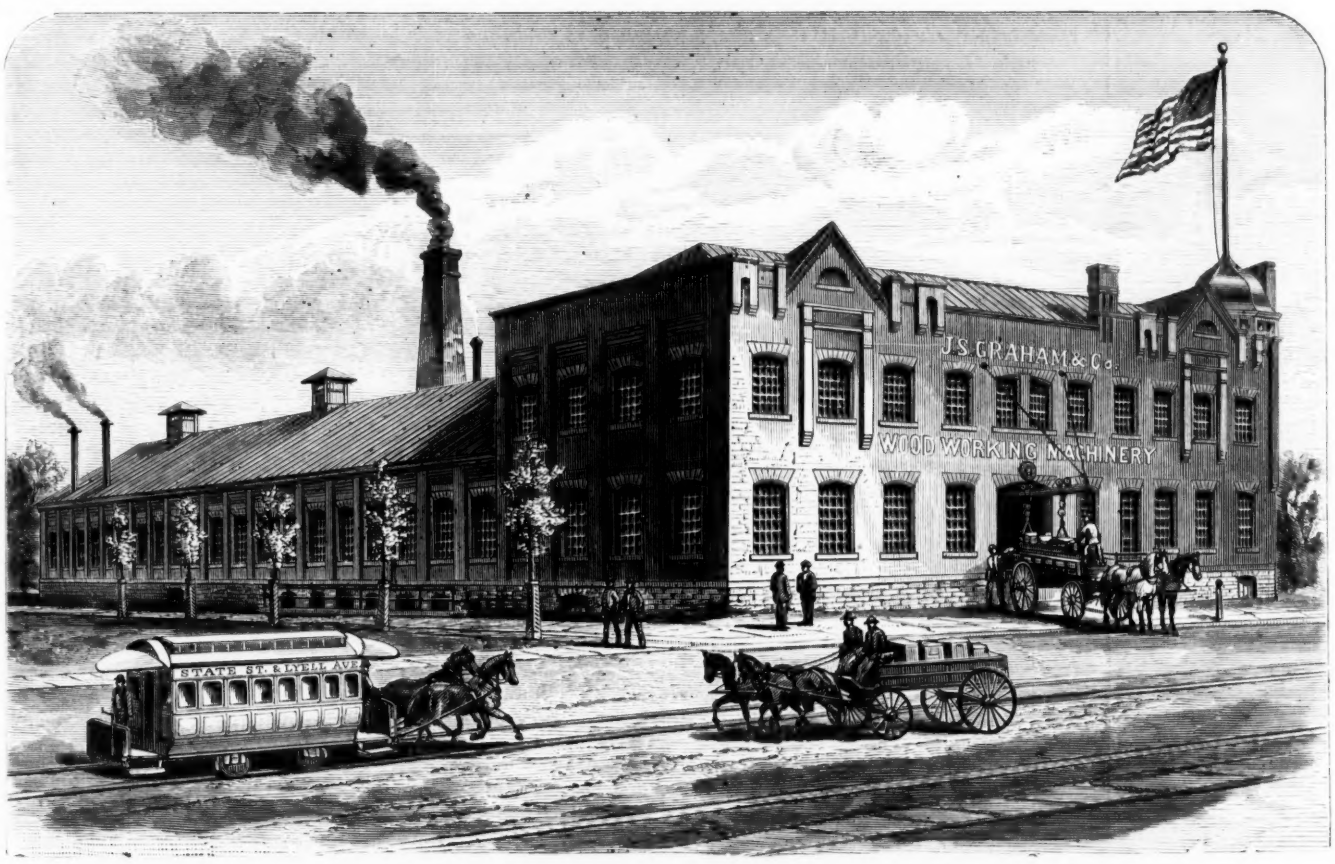
The engine room is in the basement under the center of the building, and is 50 feet by 45 feet, finished like the rest of the building and floored with asphaltum cement. Two large washing troughs of unique design are provided with hot and cold water for the employes. Hooks, etc., are also provided for their clothing.

In an annex adjoining the engine room are located the boiler, coal bins, etc. A large cistern receives all the rain water, which is used for steaming purposes, and also to prevent a stoppage in case of the city mains being broken or the supply stopped.

Above the offices on the Lyell Avenue front is located the pattern shop, 38 by 32 feet, and 13 feet high. This is fitted with the necessary machinery and appliances for a complete pattern shop.

The pattern loft adjoins the pattern shop, and is separated by a brick wall, with tin-lined doors, and this department is fitted with shelving, so arranged that any one of the large number of patterns can be found easily and quickly, as they are all classified for that purpose.

The members of the firm are J. S. Graham and John Kane. The plans for the works were made by Mr. Kane, who afterwards travelled for two weeks through the best shops in New England, and came home concluding that he could not change them for the better. The establishment is believed to be a model in every respect, and will greatly increase the facilities for turning out work.



NEW MACHINE SHOP OF J. S. GRAHAM & CO., ROCHESTER, N. Y.

LETTERS FROM PRACTICAL MEN.

How I Took Scale Off Boilers and Keep Them Clean.

Editor American Machinist:

I wrote you last March, asking for information about the use of catechu in steam boilers, and you told me about the amount to use, and asked me to report how I got along with it. I now want to give you some notes of my experience.

I am running a Reynolds Corliss engine, 18x42 inches, which develops in ordinary work about 140 horse-power, and have two steel boilers 60 inches diameter, 16 feet long, with 50 tubes 4 inches diameter and 14 feet long. In connection with the boilers there is a Pierce & Stillwell heater. The feed water is taken from a driven well 12 feet deep. All through the Platte Valley, in Nebraska, where I am located, the well water is very hard.

In using the catechu, I soaked up twenty-five or thirty pounds, and took about one-sixth of the liquid and put it in the boiler before closing up the manhole. We only use one boiler at a time, and clean the other while running, and we run day and night, or 143 hours per week, without stopping. I put in the rest of the liquid by degrees, putting in a little each day, getting the last part in on the sixth morning. That boiler was then permitted to cool down after the sixth day's work, and we let it stand full of water for three days. The water was then run off, and the boiler washed out with water from a force pump at 80 pounds' pressure, then scraped and washed again. We generally washed and scraped boilers two or three times a week at first, and on Saturday the boiler was filled up with hot water. In the other boiler I put in about five pounds of sal soda, dissolved in water, before I put in the manhead; then I put in three pounds per day for five days through the hot water pump. After this boiler had worked a week, I let it stand for three days, the same as the other, and subjected it to the same washing and scraping ordeal. When I took charge of them, both boilers were very dirty and fouled up with scale from one-quarter to one-half inch thick, and this was their condition when I began to use the catechu and sal soda.

I found in a few weeks that the boiler treated with sal soda was a good deal cleaner than the other, and it steamed easier from the first, and did not foam at all, while the catechu gave some trouble in that way. When I became convinced that the soda was acting most efficiently, I began using it in both boilers alike till I got them perfectly clean. They are both now as clean as any boilers, and I use about ten pounds of sal soda a week, which keeps them in that condition.

I am also using sal soda with success in cleaning the heaters. I put in about five pounds into the tank the day before I want to clean out. Then, when we shut down, I put in about three pounds, dissolved in water, at the top of heater, let it stand about one hour, and then take out shelves, and the scale falls off and heater is easily cleaned.

Z. M.

Correct and Incorrect Mechanical Terms.

Editor American Machinist:

I have been interested in reading in your paper for March 7th, the account of Prof. W. F. M. Goss of their method of teaching at Purdue University, and am pleased with the practical and business-like method they follow in their instructions. I am, however, surprised at the reckless use the Professor makes of some words.

Referring to his figure No. 5, if he were talking about a *buggy* wheel his word "spokes" would be entirely appropriate, but if he were to go into a machine shop, foundry, or pattern shop and talk about a pulley with six "spokes," the men, from apprentice boy up, would wonder where he came from—they would not suspect him of being a mechanical educator. Broadly, a *spoke* is a "ray of a wheel," but in common practice this word refers to that kind of a spoke that has a tenon on to fit into a mortise in the hub. Shop practice is to call these parts of a pulley or wheel its "arms." We would say a "six arm" pulley.

I think our technical schools should conform as much as possible to the common or shop usage of terms, especially when the distinction is so marked as in this case. I do not know how our professors are to accomplish this, except by shop experience.

Webster's dictionary does not meet this case, and Knight's Mechanical Dictionary is not sufficiently full in regard to the word "arm" as used practically in mechanics.

D. W. MARMON.

Indianapolis, Ind.

Cable Railway Transit.

Editor American Machinist:

In your issue of February 28, Mr. F. G. Woodward refers to the desirability of giving to the car on cable roads a speed equal to that of the cable, before applying the grip, so that the shock of starting so suddenly, and the consequent abrasion of the cable and grip, may be avoided. The desirability of this is acknowledged by those who have had experience in constructing or operating cable roads, and to some extent the plan which Mr. Woodward suggests has been carried out, and which is a natural conclusion for the engineer to arrive at, in designing a cable road. Some of the roads in San Francisco are so situated that, while at one end the grade is adapted for starting the car by gravity, at the other end the car has to be started on an up grade; notably on two roads the grade being up 1 in $9\frac{16}{100}$ and 1 in 8, respectively.

This naturally causes great wear to the cable and to the jaws of the grip, which are made removable so as to be replaced by others when worn.

It is proper to say that on these two roads a short piece of track is made level, so that the car itself is level, while the dummy stands on and starts on the grades above-mentioned. These cars and dummies sometimes weigh, with the passengers that crowd on them, 24,000 pounds, and, by an experienced gripman, they are started on these grades with but slight shock. At the other ends of the two roads above mentioned the grades are favorable to starting the cars by gravity, and the cable is gripped when the car reaches the speed of the cable, which is six miles per hour. Some of the other roads here have a speed of eight miles per hour.

While we may be able to assist the starting of the car at the end of the route by gravity, there are many places on the routes where the car has to be started on an up grade, while on the opposite track the car can be started by gravity. In other words, no more than on one-half of the route (including a round trip) can the cars be started by gravity, unless all points of stoppage of the trains can be controlled, and the grades of the streets happen to be favorable. The stops and starts from the termini of the roads are somewhere from 5 to 10 per cent. of the total starts, so that from 90 to 95 per cent. of the starts are made on the route, and generally not more than one-half of these, or from 45 to 47 per cent., can be made on a down grade or level; so that while the starting of the cars by gravity at the termini is of some importance, it is not of that paramount consequence that at first it would seem to be.

A simple contrivance is in use here for raising up the cable so that it may run into the jaws of the grip. A sheave, having its shaft at one end of a frame, is placed under the cable, and the frame is hinged at the end opposite the sheave, so that the sheave and one end of the frame may have a vertical movement. A spring placed under the frame keeps the sheave up against the cable, raising it so that it will freely enter the jaws of the grip. As the grip passes the sheave the spring yields, so there is no shock to the machinery.

Soft cast iron has so far, here, given the most economical results as a lining for the jaws of grips, as anything softer wears out too fast (brass, for instance), and a harder material is more destructive to the cable.

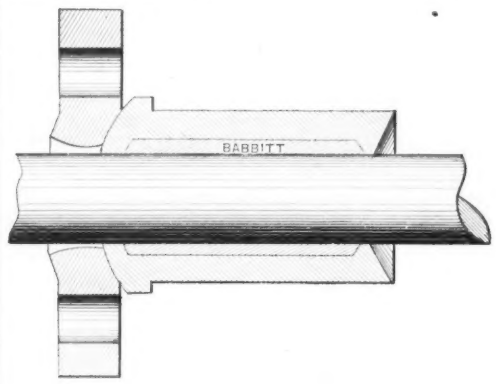
In some cases, cast-iron dies in the jaws of the grip have worn out in a single round trip, but as the cable becomes gradually filled up with tar the wear decreases, and the dies will last from two to four weeks, instead of less than so many hours. The wear of the dies is different with different men having charge of the grips, some wearing out a set of dies in from one-half to one-third of the time that others do.

In the construction of the first cable roads here, the large horizontal sheave *B*, in Mr. Woodward's illustration, was placed on a car so that it could be moved backward and forward to compensate for the stretch of the cable. The tension was effected by a weight attached to the car by a chain, which passed over a sheave. By this means a uniform tension was kept on the cable, and yet provision was in this manner made for any undue strain that might accidentally come upon the cable. At present, or on the roads later constructed here, the tension gear, as it is called, is placed in the engine house, where it is under the immediate eye of the engineer, and the movable sheaves are not used at the ends of the road, or rather the sheaves at the ends of the road are fixed.

Various methods have been adopted for driving the cables by drums, in order that the cables might have the desired friction on the drums, with the simplest mechanism and the least destruction to the cable.

So far the clip drum seems to have given the best result.

W. W. Hanscom.



A New Stuffing-Box Gland.

Editor American Machinist:

I herewith inclose a sketch of our plan of constructing stuffing-box glands, so that the rod may receive no injuries in ordinary unskilled hands. The novelty consists in making the flange separate from the gland. This, together with the babbitt, causes the rod, after only a short service, to assume a mirror-like glaze. It works "like a charm." This method is new so far as I know, is not patented, and may be adopted by any one who chooses to do so.

F. B. Cole,
Draughtsman for the R. D. Cole Manufacturing Co., Newnan, Ga.

Fuel Economy With Locomotives.

Editor American Machinist:

In the greater number of the articles written on "Fuel Economy with Locomotives," which it has been my privilege to see, and also in the one written by E. C. Haines, M. D., which appeared in the American Machinist recently, the figures are all calculated upon engine miles, and not upon loaded car mileage or tonnage of freight hauled, which, it seems to me, are the only methods by which a correct comparison between locomotives can be made.

It is a fact patent to those who are at all versed in the subject, that there are many cases of locomotives being constructed alike in every particular down to the smallest detail, and yet there will be quite a large and noticeable difference in the amount of fuel consumed in hauling the same number of cars, one of them consuming, perhaps, 20 or 25 per cent. more fuel than the others. Then again, as is often the case, there may be a difference in the train hauled by these engines, one walking off with 30 cars right straight along, and the other hauling but 27. In this case we will suppose that the engines burn, each of them, the same amount of fuel in doing this work, and when the averages per engine mile are worked up, we find that they are precisely the same, and yet one of the locomotives has done considerably more work than the other.

These figures do not therefore give us at all what we are after, *i. e.*, the actual amount of fuel consumed in hauling one car one mile, or in hauling one ton of freight one mile.

Of course, all railroad companies that have anything like a decent system of accounts, can tell at the end of the year how much fuel has been consumed in hauling one ton of goods one mile, but there are very few that can tell how much was used by each particular engine in doing that work.

On the division of the Pennsylvania Railroad, with which I am connected, we have in force a system which looks toward an economical use of fuel by the engine drivers and stokers, and we can tell at the end of each month the exact record which each particular engine, engine driver and stoker has made in the consumption of coal per car mile, and it has been through the workings of this system that we have discovered the fact that coal consumed per engine mile is not a fair index as to the economical use of fuel by a locomotive in doing work.

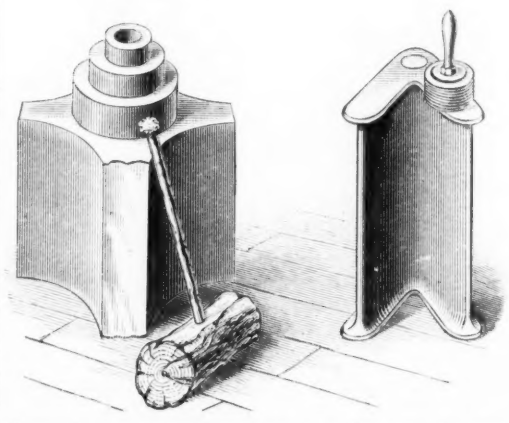
In order to see how near our engines came to the amount which Mr. Sinclair says is the average for fuel used per engine mile of freight running by American locomotives, I have taken an average of fuel consumption per mile of all freight engines on the division for the month of December, 1884, and find it to be 101 pounds. This average includes a number of engines in local freight service, and shows a difference in our favor of 19 pounds per engine mile, quite a large item in the course of a year.

Our average for passenger service is 56 pounds per mile, or 7 pounds in our favor.

We could give figures which show a very low use of coal in the moving of freight as compared with other roads, and would also be glad to give your readers a description of the system which has been so effective in promoting economy in the use of coal; but we fear that we have already taken up too much of your space, and will therefore take a back seat until wehear from some one who can give us an idea of what, in their estimation, is the best way to make a comparison between engines in this matter.

W. P. Div.

[As this is a subject in which all railroad companies are directly interested, we would like to hear from other master mechanics particulars of their fuel records.]



Litter's and Pusher's Tools for Driving Arbors Out of Work.

Tom's Experience in Driving Out Mandrels—Different Ways of Making Collars and Fitting Set Screws—How to Make a Mallet.

By James F. Hobart.

Tom was mad. He was in a hurry, too. Splitter's man was waiting for that 2″ collar. They never kept such things in stock at Litter's shop. Why not? Bless you, they couldn't. Litter hasn't got any 2″, to begin with; and he can't make one, either. Every collar is made to go on its particular shaft. Nothing is interchangeable in that shop but cuss words, and they generally fit anywhere.

Tom bored out that collar so that it would slide on the end of Splitter's shaft. Then he turned up a chunk of iron, drove the collar thereon, and finished the outside.

When Tom drove his arbor into that collar he took it to a concern behind the chimney, which looked just like the hub of an old mortise-gear, with the arms broken off short. The hole through the hub was 6″ in diameter. When Tom wanted to drive out the arbor he picked up a big collar and laid it on the hub; another "hole" top of that, then another and another, until the work would not fall through. The collar, with the arbor in it, was nicely adjusted on top of "the machine." Then Tom gathers up the "handled log," *alias* "beetle." It is 26″ long, and 8 to 10″ in diameter, between knots and splits. Tom balances himself like a Japanese juggler in the sword act. He raises that beetle up among the belts and shipper handles, brings it down with all his might, and then jumps high, wide and lively! Every one of those castings which he had piled on that hub took beelines for Tom's toes. The beetle always went off on its own hook after a blow was struck. Nobody ever knew which way to jump to get out of the way when Tom "let go," but if there was a lathe stool within "four rows of apple trees," that beetle was sure to smash it.

Tom had to take off the dog before he could drive out the arbor. When he drove a 5″ arbor out of a piece of work it was fun to get it out of that hub. He could reach it easy enough. He could just get the first joint of three fingers and his thumb down over the edge of that arbor. Just as he got it up where he could see it, off would go his fingers, and Tom would "swear, swear again."

Pusher don't believe in such tools. He can't afford them. He says he is too poor to run such a "knock-um-stiff" rig. Pusher paid his patternmaker $8 for making a pattern. The casting weighed 300 pounds. Planer man put in a day on the thing, and filled the hole full of lead. Pusher bought a big rawhide mallet. There it stands, on the casting. It weighs 12 or 14 pounds. The handle is wood. Tom could make a first-rate one if you would get him some green hide.

Cut off a piece of $1\frac{1}{4}$″ steam pipe 7″ long, and run a reamer through it. Bore out two 4″ cast washers to fit on the pipe. Put on a thread 1″ at each end, tap out two big "hex" cast nuts to fit. Make the nuts $\frac{3}{4}$″ thick. Soak the rawhide until soft. Cut into pieces large enough to work $5\frac{1}{4}$″ in diameter; cut a hole through each piece just the size of the pipe; put one nut half thread on, with one washer, and fill up with pieces of rawhide. Take it to the boring machine, set it on the face plate and bring the spindle down on it. Squeeze it as hard as you dare to. In about an hour put on more pieces of rawhide, and squeeze again, then put on the other washer and nut. Dry and screw up to full thread; may have to take out or put in a piece. When dry, put it in the lathe and turn down to 5″. Some day that mallet ought to wear out. It won't do it in our day. It will not jamb finished work, either. Let Tom turn a handle and drive it into the pipe. You will break a handle very often. Pusher got mad one day, and drove a piece of steam pipe in it for a handle. It never broke again. It will last as long as the monkey-wrench with the pipe handle.

What a blow you can strike with that mallet! Almost drive the collar through the casting. What a nice thing that casting is, too. You don't have to take the dog off. You can keep the arbor in one hand, while you strike with the other. No jumping both feet off the ground at once on this job. When the old beetle was coming down, you used to wonder if both ends were getting there at once. You don't skin your knuckles by trying to fish arbors out of an old hub. No hunting collars among the blocks by the upright drill, or chasing them across the shop as they roll away under the lathes after they made that jump for your pet bunion. You hook the work on that nice casting, let the rawhide mallet fall once on the end of the arbor, and the job is off.

That hole full of lead is a mighty nice thing, too. You can stand an arbor upon it, and drive on the other end all you want to. No fear of spoiling a center or brooming the arbor.

The said Tom was mad, and he had cause to be. It was ten minutes of twelve. He knew the speed would go down before he got the set screw in. It did stop just as he got the hole drilled, and Tom had to tap that hole with a "sqush tap."

How one of those old square tops did use to hold back. I used to wrestle them through cold-pressed nuts for inch bolts. I never wanted to pitch that tap into the river, did I? One day I got disgusted clear through, back again, and clinched. I took that No. 8 tap and annealed it, and then put it between two pieces of lead in the vise, and cut a channel with a three-cornered cold chisel the whole length of the thread. When I got that tap filed up nice I tempered it, and no better cutting tap is on deck to-day. I took all our square taps to the shop as soon as I got a chance and fluted them. What a curiosity those taps were to the blacksmiths! No

"lightning cut" taps then. I could punch a nut to slip over a bolt and then "raise" a thread. It used to be handy, sometimes. There was no need of calipering bolt and nut, and then allowing for the depth of thread.

I served the dies the same sauce. I filed them back so they would *cut*, not *jamb*, and I could do a day's work without wondering if my arms would hang on till six o'clock.

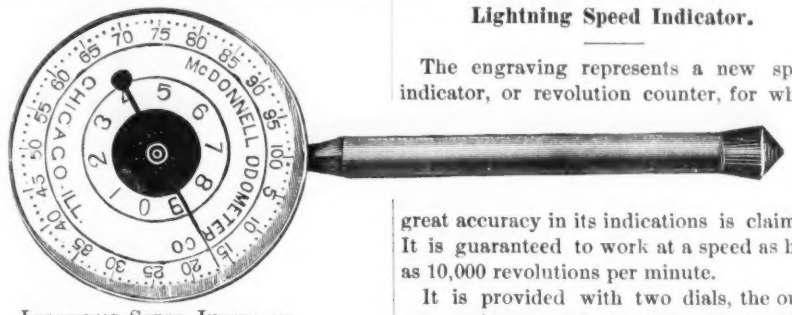
The old tools are gone, and the work is gone with them. The boys don't have to get up a muscle now-a-days. They can go to school and learn to hammer their thumbs and watch rulers all at once, and then take on their exercise with Indian clubs and roller skates. The apprentice has gone with the "sqush" tap, and if Sam has got brains and pluck he will soak in the benefit of his father's experience. He will quit his technical school chuck full of algebra and shop kinks. If Sam has learned *how to think*, then the business won't hold him. He will go up, up, clear up to the top, and the technical journal is the exponent of his knowledge.

Tom squirmed the old tap into the collar, and found a set screw that would follow. When he put that collar on the shaft it slid on two feet and stuck. Tom turned it half around, and it slid on 6″ further. No use; it won't go. There's a big place in that shaft. The tool got dull when the shaft was turned. Tom yanks off that collar and files it. He files and tries, then tries and files. At a quarter of one that collar slips over the big place and slaps up against the pulley $\frac{1}{16}$″ too large. Tom curses the luck, and goes to a cold dinner. Time, 3 hours 20 minutes.

When Pusher wants a 2″ collar he goes to a cupboard and takes one. It is just $1\frac{15}{16}$″. That big reamer has been through all of them. Pusher goes to a box, picks out a set screw, and starts for the shaft. He knows the screw will fit; he knows the collar will fit; he made the shaft last year. It all went through that ring. He never saw the man who made that set screw; he bought 1,000 in New York, and can't tell one from another. Time on that job, 7 minutes. Pusher charges just as much as Litter did, and did the job in 3 hours and 14 minutes less time. Pusher can't afford the "hub extractor" to drive out arbors. It didn't cost Litter anything to make it, and wouldn't cost Pusher 10 cents to duplicate it. But he says he is too poor, and spends $15 for his cast iron concern.

Litter never will tip over the State in climbing up top of the machine business. You will never read anything signed Litter unless it is an assignment. No technical exponent business about John Litter. He doesn't read the AMERICAN MACHINIST. He never heard of it. And he will run his sqush taps until the "hub arbor extractor" gets rusty as his tombstone.

The pumping engine "Ontario" which we illustrated last week was built by the I. P. Morris Co., Philadelphia. We ascribed its construction, by mistake, to the Dickson Manufacturing Co.



LIGHTNING SPEED INDICATOR.

Lightning Speed Indicator.

The engraving represents a new speed indicator, or revolution counter, for which great accuracy in its indications is claimed. It is guaranteed to work at a speed as high as 10,000 revolutions per minute.

It is provided with two dials, the outer one stationary and the inner one movable. The outer dial registers revolutions to 100, and the inner one to 1,000. The inner dial receives a motion from differential gearing that revolves it enough slower than the hand to lose one of the divisions during a revolution, so that by observing the inner dial the hundreds of revolutions are seen, and the single revolutions are read from the outer dial.

The tip is of rubber, which insulates it when used about electric lighting machinery; it is also claimed that the rubber tip is less liable to slip than the ordinary steel point.

The dial is silver plated, and the entire mechanism protected from dust by a heavy, tight, watch crystal.

It is made with four different lengths of spindle, viz.: $\frac{1}{2}$ inch, 1 inch, 2 inches, and 3 inches long, to suit different requirements.

J. H. Wallace, 25 Maiden Lane, New York, is general agent for these indicators.

The *Watchmaker* says small articles may be plated with brass by dipping them in a solution of nine and one-quarter grains of sulphate of copper and an equal amount of chloride of tin dissolved in one and three-fourths pint of water.

The Lane & Bodley Company's Corliss Engine.

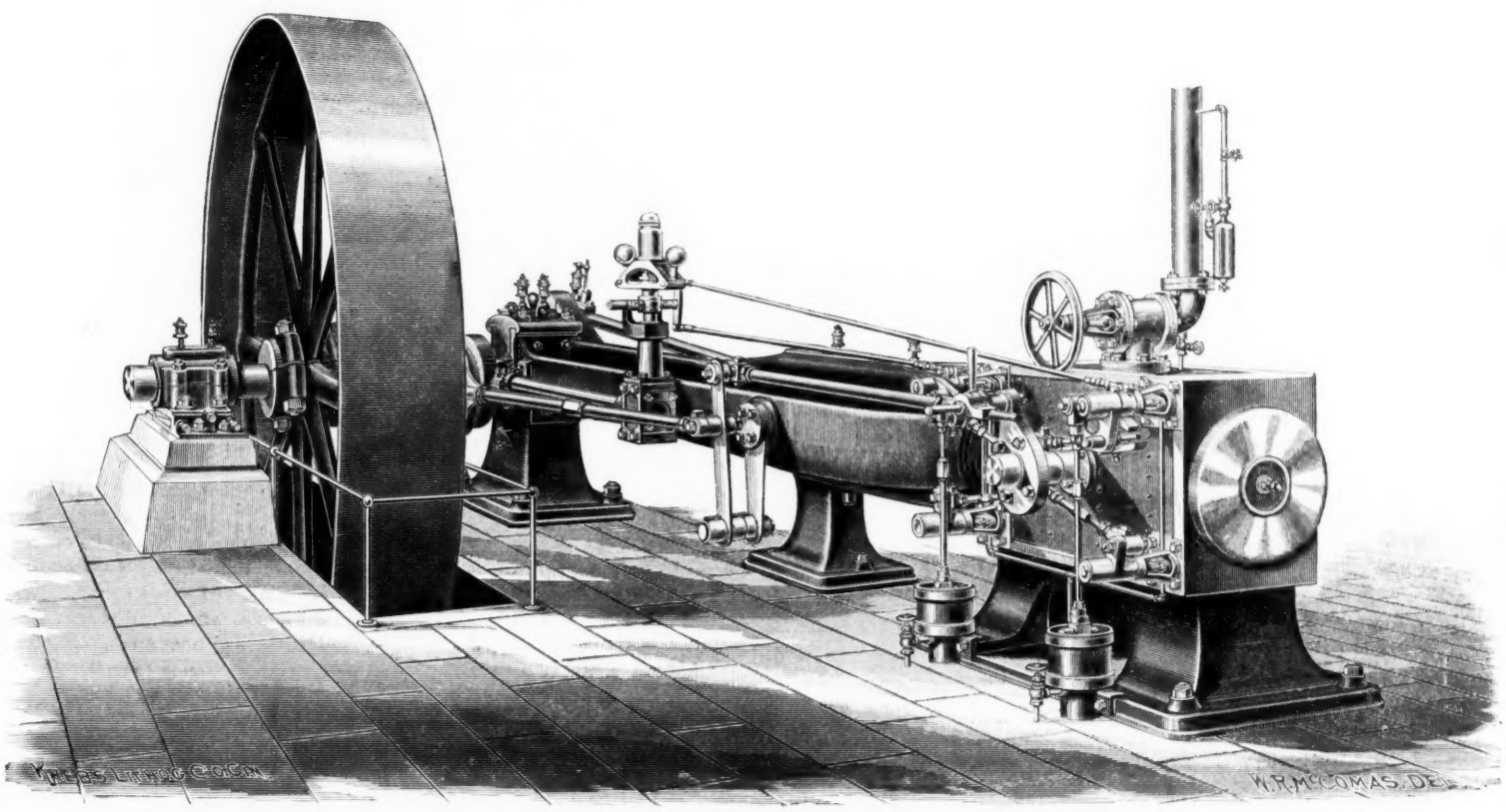
We present with this engravings representing one view, and some of the details, of the Corliss steam engine, which the Lane & Bodley Company, Cincinnati, Ohio, have recently commenced to manufacture. In its general features this engine is like others of its class, but in the details some departure has been made from stereotyped practice.

Fig. 1 represents the frame or bed in cross section. It is of the regular girder form, but instead of the guides being part of the bed they are separate pieces of steel, inserted in the bed in such a way as to be removed and replaned, should it be necessary. The large flat surfaces give ample wearing surface, little friction and good provision for adjustment.

The cross-head is shown in Figs. 2 and 3. As will be seen the pin is located centrally with reference to the slippers or gibs. The slippers are adjusted by wedges which have lateral movement, and provide full bearing for the back of slippers, preventing unequal adjustment. The slippers are secured to the cross-head by screws; these screws also clamp the wedges. By removing the screws the slippers can be slid out endwise from the cross-head. A drawing screw is furnished with each engine, by means of which the wrist pin can be withdrawn. A hole is tapped in the cross-head, and a stud furnished, which provides for attaching indicator motion.

Fig. 4 shows the construction of the bonnets on the valve motion side. They are extended into the valve-motion cranks, forming rigid bearings for the latter to swing upon. This construction makes the strain upon the valve stems tortional only. The stems are of phosphor bronze and extend through the valves to the flat bonnets; by removing these, and the keys that secure the cranks to the stems the valves can be removed without disturbing the valve motion.

The governor is of the light ball and spring type, which can be adjusted and regulated to suit different conditions; it runs at moderately high speed, and does not require the use of a dash pot, or other restraining device.



LANE & BODLEY CORLISS ENGINE.

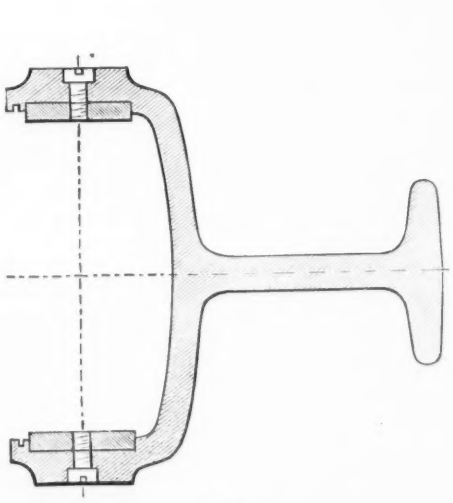
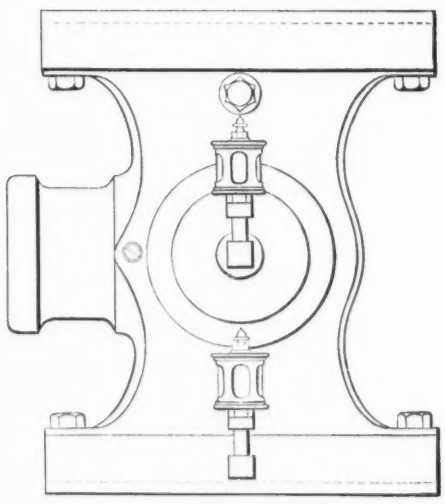


FIG. 1.



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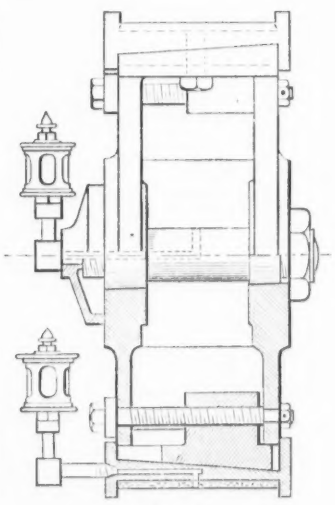

FIG. 3.

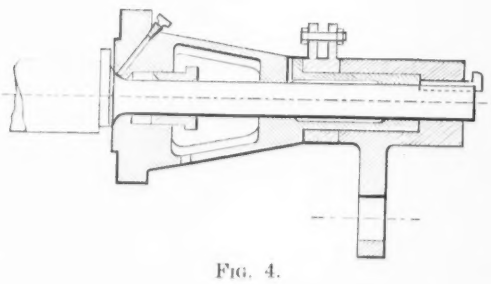

FIG. 4.

AMERICAN MACHINIST

PUBLISHED WEEKLY

BY

American Machinist Publishing Co.

HORACE B. MILLER, Pres't.

JACKSON BAILEY, Vice-Pres't.

LYCURGUS B. MOORE, Treas. and Sec'y.

96 Fulton Street, New York.

JACKSON BAILEY, Editor. HORACE B. MILLER, Business Manager.

F. F. HEMENWAY, ANGUS SINCLAIR, Mechanical Engineers.

The American News Company,

Publishers' Agents, New York.

The International News Company,

11 BOUVERIE STREET (Fleet Street), LONDON, ENG., will receive subscriptions for the AMERICAN MACHINIST, at 14/7 per annum, postage paid.

DEALERS SUPPLIED BY

The American News Company, New York.
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The American News Company, Kansas City, Mo.
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The Toronto News Co., Clifton Branch, Clifton, Ontario, Canada.

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$3.50 a year to Foreign Countries, postage prepaid, except Bolivia and South Africa, to which the subscription rate is $4.50 a year, postage prepaid.

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NEW YORK, MARCH 28, 1885.

CONTENTS.

	PAGE
Dickson Locomotives	1
Artesian Wells in Georgia	1
New Men. By S. W. Goodyear	2
Lathe for Turning Steel-Tired Wheels	3
An Ancient Brake Device Rejuvenated	3
The Trouble with the Philadelphia Traction Company's Road. By W. Barnet Le Van	4
Blacksmith Shop at Renovo	4
A Model Machinery Establishment	4
Letters from Practical Men—How I Took Scale Off Boilers, and Keep them Clean—Correct and Incorrect Mechanical Terms—Cable Railway Transit—A New Stuffing-Box Gland—Fuel Economy with Locomotives	5, 6
Tom's Experience in Driving Out Mandrels, etc. By James F. Hobart	6
Lightning Speed Indicator	7
The Lane & Bodley Company's Corliss Engine	7
American Agricultural Machinery Abroad	8
Where Are the Electric Motors?	8
New Vessels for the American Navy	8
Literary Notes	9
Questions and Answers	9
Manufactures	9
Machinists' Supplies and Iron	10

American Agricultural Machinery Abroad.

One of the most valuable pamphlets issued by the State Department at Washington is No. 48 of the United States Consular reports, bearing date of December, 1884. It contains the reports of our consuls on agricultural machinery in their several districts in answer to a circular from the Department.

During the last fiscal year only $3,888,000 of American agricultural machinery and implements were exported.

The home trade has heretofore been sufficient to keep all the shops busy, but since dull times have come upon us the foreign demand is of great importance.

So many inquiries for information about the wants and supplies of various countries reached the State Department from manufacturers of agricultural implements, that they were prompted to send a circular to consuls and gather the information required. The reports cover almost all countries of the world, and every manufacturer of wares of that kind should procure a copy of the pamphlet (about 800 pages), and study it well. In order to supply the demand from any country, such articles must be furnished as are in use. It is not profitable for manufacturers to do much missionary work in educating the users of primitive implements up to an appreciation of modern tools. A better quality is always acceptable if the price be low enough, but a change in shapes is not easy to introduce.

The modern agricultural machines and implements used in Europe are made mostly in England and Germany. They are not as well finished as those made in this country, but they are cheap. More metal is used, and the tools appear clumsy, but the buyers believe them to be stronger than American implements of lighter build.

Consul Sillcox, of Bremen, who has had thirteen years' experience in introducing and establishing a demand for American agricultural machinery and implements in Europe, says:

I would advise manufacturers in the United States who desire to build up a trade in Europe, to do so with a direct representative, establishing an office centrally located on the continent of Europe, where attention may be given to the wants and demands of such a trade.

It is a generally established fact that all our tools and smaller machines which are constructed of iron, steel, and wood combined, have preference over those of all other countries; but of machines constructed of iron, such as engines and thrashing machines, chaff-cutters, plows, cultivators, harrows, etc., preference seems to be given to the English and Continental makers. The finish may not be quite as elaborate as the American, but they are solid, and adapted to the manner of tilling the soil over here. In order to establish a trade with any of the machines or implements, the American makers must ascertain if they can supply at prices ruling the market delivered in Europe, and then make what slight changes are required.

* * * * *

The most important work for the United States manufacturers desiring to make a trade in Europe is securing ocean freights, and to study the best manner in which they can pack their wares most compactly. All machines and implements should be shipped in a knocked-down form, and so packed gaining every inch of space possible; marking the parts intelligibly, so that there will arise no difficulty in putting them together on their arrival at their destination. No case should exceed 1,000 pounds in weight. All goods go by cubic measurement as soon as they reach the vessel, and 40 cubic feet constitute a ton. If they are implements, several should be cased together in one or more boxes, giving at same time net and gross weights of each package. This matter is one of the most important for manufacturers to study; upon this alone depends their securing a large demand in Europe.

On the continent of America, our manufacturers have, as a rule, the advantage over European rivals. The imports of agricultural implements into Mexico are almost entirely of American manufacture. No other country can compete with the United States in that market with this line of manufactures. In South America and Central America, our manufacturers of agricultural implements are working up a considerable trade.

In Brazil, European manufacturers have a great advantage, by reason of their numerous and regular steamship lines.

The pamphlet gives information about tariffs, freights, credits and other essential matters. A number of quaint implements are shown by cuts.

Where are the Electric Motors?

The electricians, or capitalists and patentees interested in electric motors, who have been for months asserting that electrical transmission of power could be economically applied to the moving of railroad trains, are tiresomely slow in reducing their schemes to practice. Months ago we were told, and the assertion was industriously repeated by the daily press, that Mr. Daft was making preparations to lay electric conductors on the Brooklyn Bridge, by which he would at once demonstrate how cheaply and promptly the cars would be moved by electricity. That scheme was suddenly abandoned, without any cause given, and we were then told that Mr. Daft was going to experiment with electric motors on the Ninth Avenue Elevated Railroad. Mr. Daft was wise in his generation in abandoning the Brooklyn Bridge, where heavy tractive power is needed, and the exact power used to move cars by cable can easily be ascertained. He has now got official permission to lay down a conducting rail on the Ninth Avenue road, but week after week passes and nothing is being done to forward the work. Mr. Field's company has got permission to lay a rail on the Second Avenue road, and they also do nothing further in the matter. Come along with your electric motors, gentlemen, the public is waiting for them, and you have roused expectations that ought to be allayed.

A member of the New York State Legislature from Brooklyn, has reached the galling necessity of paying his fare when he travels by rail. He loaned his free pass to a friend; the loan was discovered, and the pass taken up. When bills affecting the railroads are hereafter brought up for action at Albany there will be one member, at least, under no obligations to return "courtesies" by supporting the interests of a corporation when they conflict with the interests of the people whom he is supposed to represent.

One of the very best things that could happen for the people who elected the Albany legislature would be for every member to loan his pass and let it be taken up and canceled. We might then expect some legislation upon transportation matters unbiassed by personal favors and petty bribes.

New Vessels for the American Navy.

The last Congress has placed a very important responsibility upon the new Secretary of the United States Navy that will eventually bring a great deal of adverse criticism upon that official. The Senate and the House, in making an appropriation for new vessels to be constructed for the navy, decided that the vessels should be built under the direction of the Secretary of the Navy, and he will be held responsible for their success. It seemed a wise decision, so far as the interests of the country are concerned, to have a prominent officer held accountable for the success of the additions to our navy, but it may not conduce very much to the comfort or popularity of that officer; for, unfortunately, the best authorities on maritime matters are so much at variance about what is the most efficient form of man-of-war ships, that there is certain to be violent shouts of objections raised, whatever form of vessel the Secretary may decide to have built. The cruisers now under construction were designed by the Naval Advisory Board, a body which has had to bear considerable obloquy arising from objections raised against the vessels they were responsible for designing. The gentlemen composing this board are likely to be consulted respecting the new ships, but whatever they advise will be merely accepted by the Secretary as views worthy of serious consideration. He will also, no doubt, consult with the most experienced shipbuilders in the country; and the practice of foreign countries in naval shipbuilding will supply valuable guidance.

The Chicago is a substantial ship and will compare favorably, when finished, with many foreign cruisers, but she is deficient in speed, and her fuel-carrying capacity is so limited that the vessel could not steam at full speed of thirteen knots an hour from New York to Queenstown without getting short of coal. If we are going to have vessels that will compete in speed with ocean steamers, and be able to carry fuel to admit of leaving sight of coaling stations, the new ships will have to be made larger than anything yet designed for our navy. A vessel recently designed for the British navy will have a displacement of 10,000 tons, and will be capable of steaming twenty-one knots an hour. When we are having new ships built for our depleted navy, it seems to be the course of wisdom that we should have something equal to the best afloat. Should Mr. Whitney decide to follow British designs, he would be certain to incur opposition from the advocates of small vessels; but it is very desirable that we should have at least one ship capable of overhauling the best vessels of any third-rate nation that might fancy to raid our coasts.

The efficiency of a screw jack in transmitting the work put into it is only about 18 per cent.; the efficiency of a hydraulic jack on the other hand when in good order is about 80 per cent. If this comparative efficiency were better understood we believe the hydraulic jack would be more used in shops where heavy weights have to be raised short distances. In many quarters there is a stupid prejudice against hydraulic jacks founded on ignorance of how that tool operates, but the philosophy of its action is simple and within the comprehension of any ordinary mechanic.

A correspondent writes us that he has trouble in getting the number of pieces from foundry that he marks on the patterns, and would like to know of some way of marking better than chalk; something that will not rub off with handling, but that can be removed without much trouble. He writes that it doesn't seem to cure his trouble to make out a list; what he wants is some way of marking the number on the patterns.

It has long been the fashion to claim for modern inventors and mechanics exclusive credit for the development of everything connected with the application of steam to the arts. Yet indications are occasionally found that the ancients knew more about steam than they are generally credited with. In a museum in Naples there is a small copper vessel for heating water, found in Pompeii. It involves nearly all the principles of a good modern steam boiler. The vessel is really a small vertical boiler, with a single flue and a separate fire-box having a water grate. These refinements of invention were not made by people ignorant in applied mechanics.

Press dispatches give an account of the recent death of a boy—a mere child ten years old—in a wire factory in New Haven, Conn., under the most shocking circumstances. He had only been employed two or three days, and, so the dispatch says, when found "nearly half a mile of wire encircled him." We do not know what the law is in Connecticut in regard to employing infants with no one to look to their safety, in dangerous situations; we do not know that it makes much difference what the law may be. Several States have laws on the statute books that if properly enforced would make such accidents less likely to occur, but we seldom hear of their enforcement. There is something peculiarly saddening in the thought of a mere baby like this, who ought to have been at school or at play, being put at work in a situation where such an accident as this is possible, and killed before he had time, even if he were old enough to learn the dangers of his position. We are informed that on the day he was killed he had complained of being

sick, but was refused permission to go home. If there is any law that will prevent this, it ought in the interests of humanity and decency, to be enforced.

In looking over the engines of the new United States steamer "Atlanta" we were unfavorably impressed with the great diameter of the cylinders for the length of stroke. A pair of compound engines put into an Italian torpedo ram built recently at Newcastle, England, have the fault of short stroke and great diameter much more aggravated than the engines in our American boats. The high-pressure cylinders in that boat are 44" diameter, and the low-pressure cylinders 85" diameter, the stroke being 36".

Our correspondent, Z. M., who tells graphically in this issue "How I Took Scale Off Boilers and Keep Them Clean," shows an example well worthy of imitation by other engineers. He took charge of boilers that were heavily coated with scale, and had to make the best of the lime-charged water of the calcareous regions of Nebraska for feeding purposes. But he proceeded vigorously and systematically to clean off the old scale and to prevent the water from making new incrustation, in all of which he was entirely successful. Men of this kind honor their calling, and demonstrate plainly to employers the advantage of having engineers of intelligence, with extended knowledge of their business.

An item is going the round of the press that reads: "When Edison, genius and inventor that he is, had spent two weeks of his valuable time riding on the elevated railroads of New York trying to discover what caused the noise, so that he might devise a cure for it, he gave up the job. Then a woman took it up and rode round under jeers and discomfort pursuing her inquires. But she discovered the cause and devised a remedy which was patented, and for which she received the sum of $10,000." Noble persistent woman. Don't the people of New York wish her remedy had been as successful in stopping the noise as it was in bringing her a big sum of money? We fancy Edison's head was level when he abandoned the job.

Under the caption, "Fuel Economy with Locomotives," on another page, a master mechanic belonging to one of our leading railroads criticises the practice of charging fuel consumed by locomotives to "engine miles," and shows the advantage of the record being reduced to "car miles." This is a subject of growing importance, and we would like to have the subject of fuel accounts discussed in all its bearings by those most competent to judge respecting the merits of different systems. What accurate records of coal consumed can do in the way of encouraging fuel economy is only beginning to be made manifest to the railroad companies in this country. No line of economy in railroad operating gives such encouraging results as the saving to be derived from the improved use of fuel; and an excellent feature about this line of saving is, that it reduces the remuneration of no man's labor.

L. C. Jewett, who has for some time been superintendent of the foundry department of Otis Brothers & Co., at Yonkers, N. Y., has been advanced to the position of general superintendent of the works. Mr. Jewett has had an extended mechanical experience, and has first-class executive ability.

Literary Notes.

SPONS' MECHANICS' BOOK. A MANUAL FOR Handicraftsmen and Amateurs. E. & F. N. Spon, 35 Murray St., New York.

This book treats a variety of subjects too numerous to mention, relating to work in metals and woods, and other industrial operations. Every mechanic will be sure to find something of interest in it, and amateurs will find it a valuable assistant. It is a work of 700 pages, and sells for the moderate price of $2.50.

QUESTIONS AND ANSWERS.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common sense methods.

Every question, to insure any attention, must invariably be accompanied by the writer's name and address. If so requested, neither name, correct initials, nor location will be published.

(104) Stack, Baltimore, Md., asks: Will a chimney have a better draught if the flue is larger at the top than at the bottom—say 18" square at the bottom and 24" at top? *A.*—It is generally held, and we believe correctly, that it will. Chimneys at the present time are very generally built in this way.

(105) W. H. G., St. Paul, Minn., asks: Will a water gauge glass become reduced in thickness by use, and if so, is it on the outside or inside? *A.*—The reduction by wear will be mostly by slight motion of glass in packing, and will be on the outside and at ends. The wear on the inside will hardly be measureable. Sometimes the steam attacks the glass, eating it away.

(106) C., Ilion, N. Y., asks: 1. What causes a locomotive whistle to squeal, and how can it be remedied? *A.*—Water blowing through with the steam will make the whistle squeal; so will a high wind that blows part of the steam aside so that it does not strike the cap straight. The cap set badly will also cause squealing. 2. Does moving the cap nearer to or farther from the steam opening affect the tone of the whistle? *A.*—No. It affects the volume, but not the tone.

(107) N. W., Comersville, Ind., writes: 1. We have trouble brazing our band saws, from the blade being soft after the brazing. What is the best way to braze and temper? *A.*—Fasten with silver solder and cool off with water as soon as the solder flows. If the blade is too hard, you can draw the temper with a pair of hot tongs each side of the lap. 2. Has the patent on driven wells expired so that anyone can drive a pipe in the ground and put a pump on it? *A.*—Yes.

(108) Subscriber, Simcoe, Mich., asks: What should be the proper width of steam ports, bridges, and exhaust port—the length of ports being 8"—for an engine 10"x12", to run 400 revolutions per minute? *A.*—Steam port should be 1⅜" wide to get sufficient area for that speed. You can make the bridges the same width as the thickness of metal in the cylinder. The exhaust port should be wide enough to not obstruct the passage of exhaust steam when the valve is in full travel in either direction. The width will depend upon the lap and travel you give the valve. It will be a hard-working valve unless it is balanced. It would be better, for such speed, if the ports were 10" long.

(109) E. G., West Farmington, Me., asks: 1. What would be the horse-power of a Huntoon compound engine, cylinders 5¼" and 10½"x16" running at 120 revolutions, 70 pounds boiler pressure? *A.*—We are not enough acquainted with the construction and operation of the engine named to estimate the power it would develop. The most satisfactory way to determine it is by the use of the indicator. 2. What would be a good size for ports for an engine 7"x16", also 9"x16"; what speed should such engines run, and what power would they develop with 70 pounds boiler pressure? *A.*—For 7"x16" you can make steam ports ½"x6", exhaust port 1⅛"x6", bridges ½", outside lap of valve ½", inside lap, 1-16", travel of valve 2". For 9"x16", steam ports ⅝"x8", exhaust port 1½"x8", bridges ⅝", outside lap of valve ⅝", inside lap ⅛", travel of valve 2½". Speed of both engines 150 revolutions. Such engines, under conditions named, should develop 15 and 25 indicated horse-power, respectively.

BUSINESS SPECIALS

Transient Advertisements 50 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday for the ensuing week's issue.

Curtis pressure regulator and st'm trap. Mch. 21, p 14

Presses & Dies, Ferracute Mach. Co., Bridgeton, N. J.

Steel Name Stamps, &c. J. B. Roney, Lynn, Mass.

"How to Keep Boilers Clean." A book mailed free, by James E. Hotchkiss, 86 John street, N. Y.

Tools for amateur and foot power lathes. Send for illustrations. Hartford Tool Co., Hartford, Ct.

The Young Engineer's Own Book, $3. Edw. Meeks, Publisher, 1002 Walnut St., Phila., Pa.

For Sale—26" b. g. drill presses, quick ret'n bal. spindles, new, modern tools, $150. S. M. York, Clev'd, O.

Light fine interchangeable mach'y to order. Foot lathe catalogue for stamp. E. O. Chase, Newark, N. J.

Lyman's Gear Chart. How to lay out gear teeth. Price 50 cents. E. Lyman, C. E., New Haven, Conn.

Foot Power Machinery, for workshop use, sent on trial if desired. W. F. & John Barnes, Rockford, Ill.

The latest Improved Tack and Match Machinery is made by White Machine Co., Waterbury, Conn.

Pattern and Brand Letters. Vanderburgh, Wells & Co., corner Fulton and Dutch streets, New York.

Consulting Engineer and Mechanical expert, C. C. Hill, 84 Market street, Chicago, Ill.

R. Dudgeon, 24 Columbia st., New York, Improved Hydraulic Jacks and Roller Tube Expanders.

Cooper, On the Use of Belting, $3.50. Edw. Meeks, Publisher, 1002 Walnut St., Phila., Pa.

New York Engineering Co., 64 Cortlandt Street, New York, design, construct and furnish all kinds of steam engineering work.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every description. Send for catalogue.

A few chucks, of all kinds, for sale at half price. Slightly damaged. Send for list to the maker, A. F. Cushman, Hartford, Conn.

The outline ("wax process") engravings shown in the AM. MACHINIST each week are made by Struthers, Servoss & Co., 32 Frankfort Street, N. Y.

Engine Lathes, Hand Lathes, and other fine tools. Assortment large; prices low. Frasse & Co., 62 Chatham St., N. Y.

Farley's Reference Directory of the Machinists, Iron, Steel, and Metal-Working trades of the United States. A. C. Farley & Co., Philadelphia, Pa.

Improved Tack Machinery, made by The Willets Man'f'g Co., can be seen in operation at their works, 57 Clifford St., Providence, R. I.

The Complete Practical Machinist, $2 50; the Pattern Maker's Assistant, $2.50; Mechanical Drawing Self-taught, $4.00; books for practical machinists Address Joshua Rose, Box 3,306, New York City.

Locomotive Engine Running and Management. By Angus Sinclair. Price $2. An excellent book for men interested in steam engineering, valve setting, designing valve motion, the care of the Westinghouse brake, etc. Published by John Wiley & Sons, 15 Astor Place, N. Y.

Useful Information for Steam Users—A 100-page pamphlet, on the care and management of the steam engine and boiler, with hints and rules for engineers and firemen. Every engineer should have this book. Send 25c. in P. O. stamps to the J. N. Mills Publishing Company, 145 Broadway, N. Y.

Every young man who aspires to be either a mechanic, merchant, or manufacturer, owes it to himself that he become thoroughly familiar with the writings of Chordal. John Wiley & Sons, 15 Astor Place, N. Y., have issued a new and enlarged 12 mo. edition of "Extracts from Chordal's Letters." Handsomely bound in cloth, with over 50 illustrations. Price, $2. Discount of 25 per cent. on orders for five or more copies.

MANUFACTURES.

John Robinson, Cairo, Ga., is putting in a brick machine.

Stacy & Scruggs, of Boston, Ga., are building a steam gin and grist mill.

Bell Bros., patternmakers, Cleveland, Ohio, are building large new works.

The Murfreesboro (Tenn.) Machine Works have just started a new foundry.

It is reported that a large machine and car shop will be erected in Longview, Texas.

The Progress Machine Works, Meridian, Miss., will enlarge their foundry and machine shop.

E. W. Thompson & Company, Thomasville, Ga., are putting up variety wood-working machinery.

Truxal & Dunmeyer, Chattanooga, Tenn., will probably erect a large machine shop in the spring.

The Collins Mills, at Frogtown, Mass., have been rebuilt and refurnished, and are doing a good business.

The Wampum Wire Mill Company, Wampum, Pa., will erect a wire mill. Jacob Snedden, General Manager.

N. Schneider, formerly of Schneider, Leonard & Company, has started a boiler shop at 15 Illinois Street, Chicago.

George R. Eager, of Marietta, Ga., will soon build a marble factory, and tenement houses for operators, at that place.

There is a prospect that the machine shop at Peterborough, N. H., burned a few years ago, will be rebuilt by Samuel G. White.

The Bainbridge Lumber Company's mills, which were burned at Bainbridge, Ga., last summer, will be rebuilt within a few months.

N. S. Eaves, contractor at Thomasville, Ga., is starting a brick yard. E. O. & E. W. Thompson, Thomasville, Ga. supplied the machinery.

The Talahassee *Economist* is trying to talk up a traction engine service between Tallahassee, Fla., and Thomasville, Ga., a distance of 37 miles.

J. H. Duffy has established the Eagle Iron Works at St. Paul, Minn. He will build steam engines and boilers, and do a general machine business.

B. C. Mudge, formerly Boston manager for the Deane Steam Pump Company, has taken charge of the office of H. R. Worthington, 70 Kilby Street, Boston.

The Detroit (Mich.) Machine Screw Works expect to add to their line the manufacture of horse-power fire engines of their own design and patent.

A. McKinnon, manufacturer of boilers and all kinds of sheet iron work, at Red Wing, Minn., will probably build a new shop and add new tools this summer.

O. Hammond, Jr., of Baltimore, Md., wholesale dealer in fresh meats, is putting in a 400-light Edison plant and a Ball automatic cut-off engine to drive it.

The Durham Wooden and Woolen Mills, Durham N. C., will build their intended woolen mill this spring. Building is to be 50x150 feet and a dye house 30x110 feet.

Wolff, Lamb & Company, of New York City, have sold out plant and machinery for making welding compound to the Cherry Heat Welding Compound Company, a new corporation.

The United States Electric Light Company have secured the contract for lighting the Washington monument. The dynamos will be driven by a 25 horse-power Westinghouse engine.

The Mobile Electric Light Company, of Mobile, Alabama, are erecting a new electric light plant, in which they use the Ball engine in connection with the Thomson-Houston system.

Robinson, Rea & Company, Pittsburgh, Pa., whose steam engine building establishment was burned out recently, will build new and extensive shops as soon as the weather will permit.

There is a strong probability, according to a Milwaukee paper, notwithstanding the prior claims put forth by LaPorte, Ind., that the Oliver Chilled Plow Works, of South Bend, will be removed to Milwaukee, or, rather, to Bay View.

The Cartwright Iron Company have been organized at Youngstown, Ohio, the incorporators being James Cartwright, George Peake, Charles Cartwright and A. W. Jones. The company have purchased the Alikanna Rolling Mill, at Steubenville, together with 120 acres of coal land, and will put the mill in operation as soon as necessary repairs can be made.

The *Industrial World*, speaking of business in Chicago and vicinity, says: "There is a demand for better manufacturing quarters, and builders are awakening to the value of such properties as investments. Choice locations in the manufacturing sections are much sought after, and buildings especially designed to suit the convenience of the occupants are promised in large numbers for the coming season."

A company has been organized at Birmingham, Ala., as the Curry Press Company, capital $1,000,000, by B. J. Curry, J. J. Dement and W. H. Scuggs, of Huntsville, Ala., and J. J. Hinds and Wm. H. Smith, of Birmingham; officers are B. J. Curry, Huntsville, president, and L. W. Day, Huntsville, secretary. Mr. Curry is already engaged in manufacturing cotton presses at Huntsville, but it is contemplated some time in the future to establish extensive works at Birmingham, for making presses for cotton, tobacco, etc. *Baltimore Manufacturers' Record.*

Gould & Eberhardt, Newark, N. J., have recently completed and put in operation a rack cutting machine, which is capable of dividing to the $\frac{1}{10,000}$ part of an inch. This fine dividing was necessary to complete some machinery in which certain parts must work in exact time with one another. They are also getting out a lot of 24" and 30" upright drill presses of entirely new construction. They claim these drills will do 20 per cent. more work, and are more simple and more easily handled than any upright drill now on the market.

The Niles Tool Works, Hamilton, Ohio, have recently brought out a lathe for turning steel-tired wheels, which has central driving apparatus. The face-plate and center spindle are made with gaps, so as to allow the axles to be rolled freely in and out of the lathe. The driving gear is so arranged that no filling of the gap is required. The tail stocks are placed upon the outer ends of the machine, and carry the axle on centers, or on its journals. While this lathe may be preferred for some purposes, they recommend as the standard tool for such work the machine illustrated elsewhere in this issue.

The National Pipe Bending Company, of New Haven, Connecticut, have just finished a coil containing 540 feet of 2" brass pipe, which is to be used in a paper mill in Massachusetts. They have also just made 2 coils of 1¼" iron pipe, each containing 165 feet of pipe, and have orders for 8 coils of 1" iron pipe, each coil to have 350 feet of pipe, all for refrigerating machines in a New York Brewery. Among the recent orders for the National Feed Water Heater are two of 500 horse-power for the new electric light station in Boston, Mass., and a 200 horse-power for D. J. Murray Manufacturing Company, Warsaw, Wis.

The consolidation between the Joliet Steel Company, with works at Joliet, and the Union Steel Company, whose works are in this city, says the *Western Manufacturer*, of Chicago, is likely to be consummated at an early day. An appraisement of the two plants has been made, and at the next meeting of the stockholders the matter will be submitted for definite action. The Union Steel Works, which have been idle for some time, are to be put in thorough repair, and they are to be so altered as to produce Bessemer rods by the "direct process." As soon as the repairs can be completed the works will start with a full force, which is about 2,500 hands. It will take three or four months to make the necessary repairs. To do all that is necessary, Treasurer Hilliard says, it will require an expenditure of between $300,000 and $400,000. The old way of making Bessemer rails was, first to make pure iron by extracting all the carbon, and then, after the iron had been made into pigs, it was re-melted, and a known quantity of the carbon added. In the direct process, the carbon, or a portion of it, is retained, and the molten product of the blast-furnace transferred in its molten state to the converter, after leaving which it is made into steel rails, without being allowed to grow cold from the time it is started as ore, until it is turned out in the shape of rails. The direct process is cheaper, because it requires less coal. Steel rails will not be the only product. The mills will also make wire and iron sills for buildings.

Frank B. Merrill, 44 Pearl Street, New York City, and others, are proposing to organize the Central City Water Works Company, for the purpose of supplying Syracuse, N. Y., with water, to the extent of 12,000,000 gallons per day.

Machinists' Supplies and Iron.

NEW YORK, March 12, 1885.

There is no change in the condition of the supply trade since our last report was written. Trade continues to move along quietly without notable change. Prices continue depressed, and are the subject of continual complaint. There is increasing confidence that matters will improve shortly, but, so far, no decided increase in the volume of trade has come to help brighten the business outlook.

Dealers in machine tools are rather more despondent than any class of dealers we visit. They find that there is a persistent tendency among users of these tools to get along with present stock, although this is an excellent time for buying cheap to make renewals.

The boiler-plate trade drags along in a very unsatisfactory condition. Conversations with the leading dealers leave a bad impression about the immediate outlook for revived business in the trade. The quotations for boiler plate are: Tank, 2¼c.; refined, 2¼c.; shell, 2¾c.; flange, 3¾c.; ex. flange, 4¼c.; fire-box, 4½c.

Iron—No perceptible improvement has transpired in the pig iron trade during the week. For a few weeks in the beginning of the year a disposition was manifested among buyers to abandon the practice of buying merely sufficient to supply the daily demands, but they have again fallen into the old rut. Standard Lehigh brands are steadily held, deliveries absorbing production closely enough to leave but little surplus, and outside brands meeting with moderate sale at about the previous difference in price. Buyers continue to operate almost exclusively on the hand-to-mouth principle, and consequently sales are almost wholly small lots. We quote Standard Lehigh brands $18 to $18.50 at tidewater for No. 1 X Foundry; $17 to $17.50 for No 2 X Foundry, and $14.50 to $15 50 for Grey Forge at furnace.

Scotch Pig—This market continues in the same depressed condition we have reported from week to week for months past. The sales are nearly all of a retail character. The quotations, which are nominal, are: Shotts $21.50 to $21 75, to arrive; Coltness, $21.50 to $21.75, to arrive; Glengarnock, $19 to $19.50, to arrive; Gartsherrie, $20.50; Summerlee, $20.50; Dalmellington, $19.

Antimony—The market for regulus has been quiet and steady Hallett's brand is quoted at 9⅞ cents; Cookson's, 10⅜ cents, for jobbing lots.

Copper—There has been another break in the market for ingot, values abroad having exerted a depressing influence here. The quotations are nominal at 11 cents for Lake, and 10½ cents for Baltimore and other brands.

Lead—The demand for common pig has improved during the week. Sellers ask 3.70 to 3.75 cents, and there has been considerable business done on these terms.

Tin—This market has been depressed, mostly influenced by a fall in prices abroad. For jobbing lots Banca brings 18½ cents; Straits & Malacca, 17 20 to 17.25 cents.

WANTED

"Situation and Help" Advertisements, 30 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday morning for the ensuing week's issue.

Situation wanted by an iron foundry supt. or foreman. Address Iron Founder, AM. MACHINIST.

Situation wanted, by machine and tool blacksmith, as foreman, or place at the forge. Address Fred Allen, Enfield, Conn.

An experienced engineer desires a position as chief draftsman or superintendent. Address N. S. S., AM. MACHINIST.

Wanted, by young man, position as assistant draftsman. Accustomed to locomotive work. Best reference. Address "Willis," AM. MACHINIST.

Mechanical engineer, designer and draftsman, of 20 years' experience, wants engagements. Address Box 1, AM. MACHINIST.

Wanted—Partner with nominal capital of $1,500 or $2,000, to take active interest in starting and operating boiler and machine shop. Advertiser has a complete and valuable line of machinery and tools, adapted to both light and heavy work. To a capable man this is a chance such as is seldom offered. Address "New York City" (Box 3), care AM. MACHINIST.

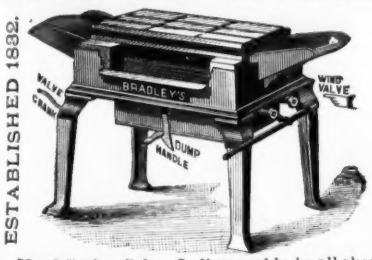
For Sale Cheap—A lot of finished hexagon nuts, ¾ standard, case hardened. Box 814, Pittsburg, Pa.

Wanted—Small foundry, or good location to build one. J. Sullivan, 76 N. Wells St., Room 14, Chicago, Illinois.

Wanted—Good second-hand turret or Fox lathe; good second-hand brass milling machine. Address J. B. Sheriff Son & Co., 68 Water St., Pittsburg, Pa.

CHANDLER & FARQUHAR,
168 Devonshire St., Boston, Mass.,
AGENTS FOR THE
Barnes' Wood and Iron-Working
MACHINERY.
Lathes,
SCROLL and CIRCULAR SAWS,
UPRIGHT DRILLS, MORTISERS, &c.
Machines sent on Trial.
Also Dealers in Supplies & Tools for Mechanics & Amateurs.
SEND FOR CATALOGUE B.

BRADLEY'S HEATING FORGES.



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Machinery and Supplies,
22 CORTLANDT ST., NEW YORK.
AGENTS FOR

The Waters
Perfect Governor.
Having Adjustable Speed, Automatic Safety Stop, Sawyer's Lever, and Solid Composition Valves and Seats. Also
SUPPLIES
For Machinists, Railways, Mills, Mines, &c.
Please send for circular and state that you saw the advertisement in this paper.

ROOFING.
For steep or flat roofs. Applied by ordinary workmen at one-third the cost of tin. Circulars and samples free. Agents wanted. **T. NEW**, 32 John Street, New York.

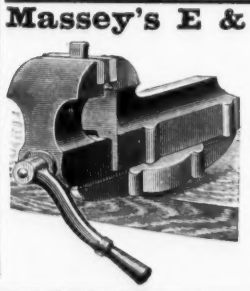
THE BROWN HAMMER
STRIKES A BLOW WITH
DOUBLE THE VELOCITY That it Raises the Hammer.
A NEW MOVEMENT! SEND FOR DESCRIPTION.
KNOWLTON MFG. CO., King St., Rockford, Ill.

FOR SALE AT A BARGAIN
A well established and good paying machine shop and foundry, including buildings, lots, machinery and stock. The business will be carried on until sold. Address
A. FALKENAU, Leadville, Colo.,
Or 123 E. 72d St., New York City.
Only reason for selling, ILL-HEALTH.

STEPHENS PATENT PLANER CHUCKS

Combine valuable features offered by no other tool. In range of opening; advantage of self-adjusting jaw worked by a single screw; graduated base, etc. Parts interchangeable. Chucks guaranteed. Sold by the trade. Send for Catalogue.
MELVIN STEPHENS, Prop'r, Office, 41 Dey Street, New York.
Self-Adjusting.

Massey's E & K Patent VISES.



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Simply constructed, convenient and durable.
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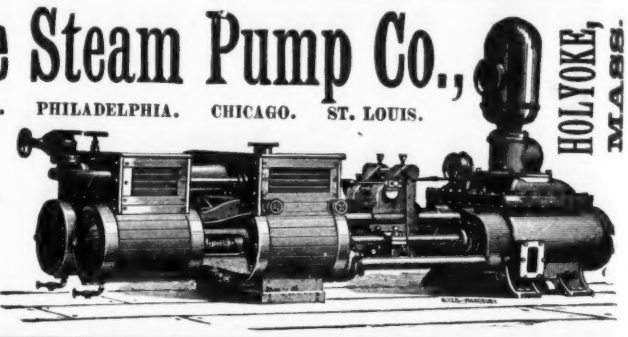
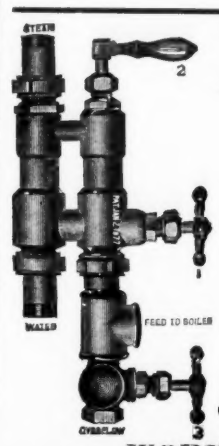
Eastern Depot,
LINK BELT CO.
81 John St., N. Y.
Write for Description.

The Deane Steam Pump Co., HOLYOKE, MASS.
NEW YORK. BOSTON. PHILADELPHIA. CHICAGO. ST. LOUIS.
MANUFACTURE
PUMPING MACHINERY
FOR ALL DUTIES.
Send for New Illustrated Catalogue.





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BOILER FEEDER FOR ALL CLASSES OF BOILERS.
OVER 70,000 IN USE.
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THE HANCOCK INSPIRATOR CO.,
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WORKS, BALDWIN STREET, BOSTON.

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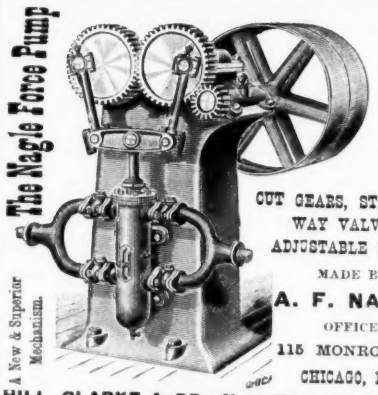
JAS. HUNTER & SON, North Adams, Mass.

Established in 1874.
CLEVELAND TWIST DRILL CO.
24 and 26 West Street, Cleveland, O.
101 Chambers Street, New York.
85 Queen Victoria St., London, Eng.

STANDARD TOOL CO., Cleveland, Ohio. { W. A. BABCOCK. Manager.

The Nagle Force Pump



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CUT GEARS, STRAIGHT WAY VALVES, ADJUSTABLE FEED.
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AN EXCLUSIVE SPECIALTY.

H.W.JOHNS' ASBESTOS PISTON PACKING
Our improved elastic Asbestos Piston Packing is composed of the best quality of pure Asbestos fibre, and forms the most perfect, compact, and durable Packing ever produced for locomotive, marine, and other engines, valve-stems, &c. It requires less oil than any other, being to a great extent self-lubricating and wears ten times as long as ordinary packings. It is proof against acids.
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Asbestos Gaskets and Rings,
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Our ASBESTOS CEMENT FELTING is the most effective and durable NON-CONDUCTING COVERING for STEAM PIPES, BOILERS, STILLS, and other Steam-Heated Surfaces. It is composed of Asbestos fibre and a cementing compound, which forms a light, porous Covering, partaking of the nature of a Felt and a Cement. It can be easily applied by any one.
Asbestos Hot Blast Cement Felting,
Asbestos Air Chamber Covering,
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Asbestos and Hair Woven Felt.
We also manufacture Asbestos Cloths, Asbestos Cord, Twine, Yarn, and Sewing Twine, Asbestos Sheathing, Asbestos Paper, Asbestos Gasket and Retort Cements, Sheathing Felts, Etc., also the Standard
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Descriptive Price List and Samples free.
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Improved Screw Cutting
FOOT or POWER LATHE.
14"x40", 6' bed, price $175.
Catalogue of Lathes, Drill Presses and Machinists Tools and Supplies. Mailed on application. **Lathes on Trial.**
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JAMES D. FOOT,
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SOLE Representative of
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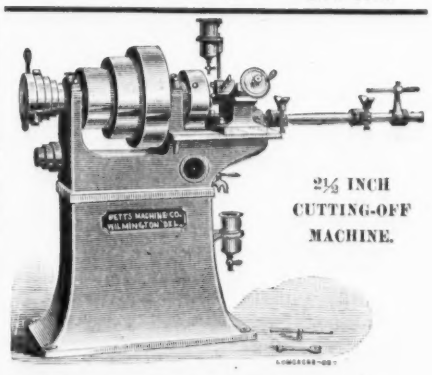
A Handbook on the
CARE OF BOILERS
By KARL P. DAHLSTROM, M. E.
Crown 8vo, Cloth, 50 Cents.
E. & F. N. SPON, 35 Murray St., New York.



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MACHINE TOOL BUILDERS,
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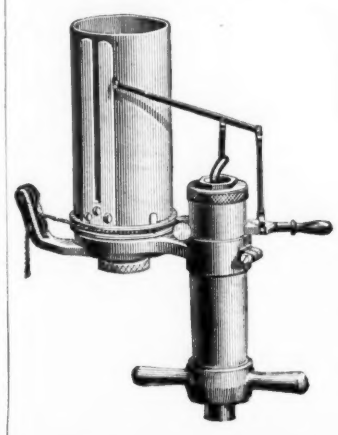

TESTIMONIAL

ON THE MERITS OF THE

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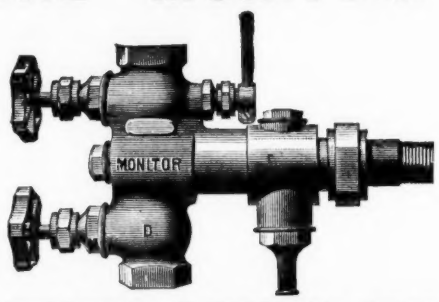

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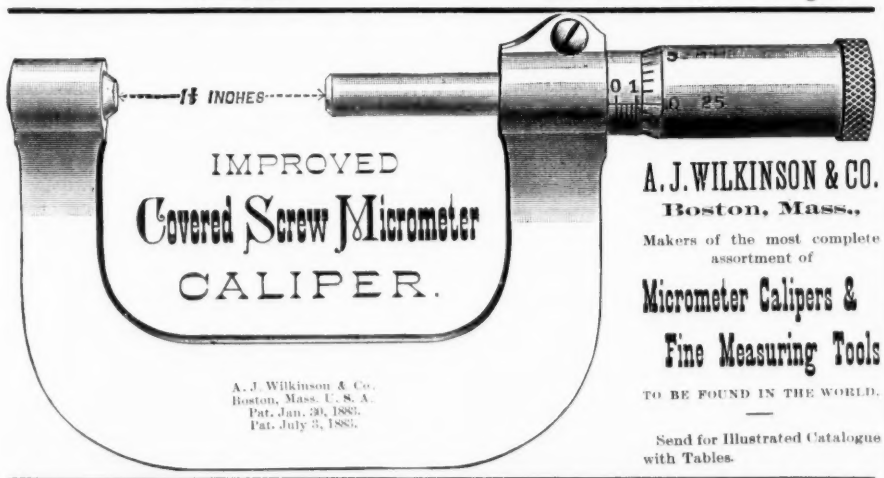

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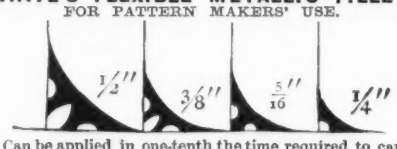

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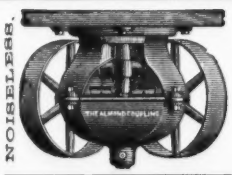

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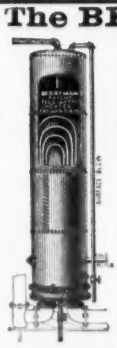

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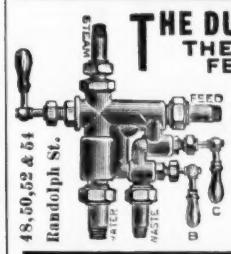

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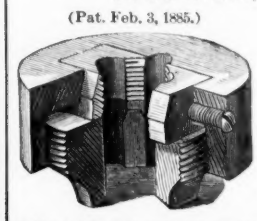

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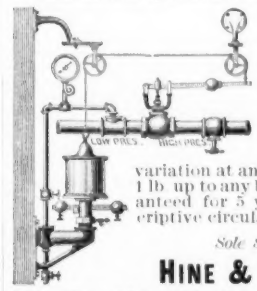

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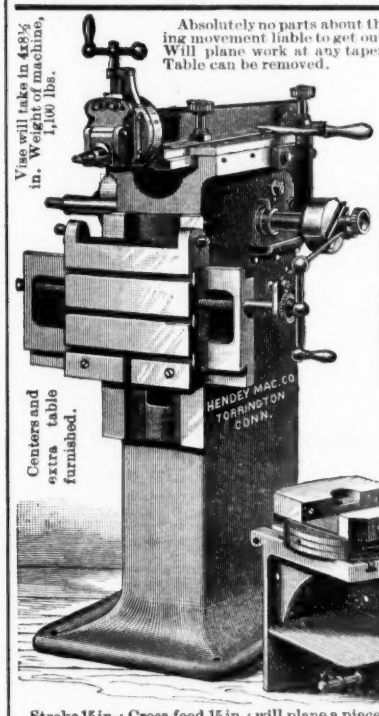

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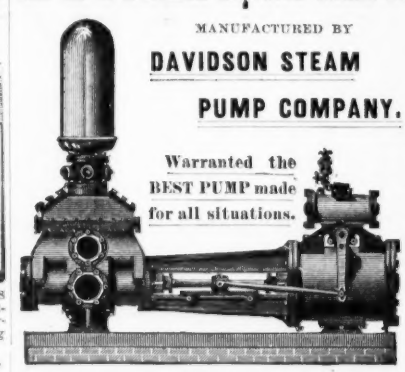

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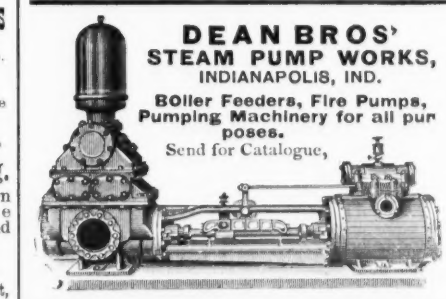

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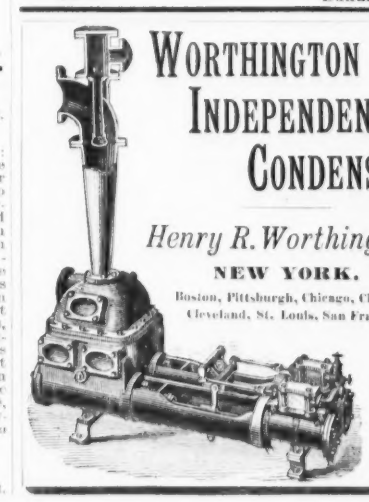

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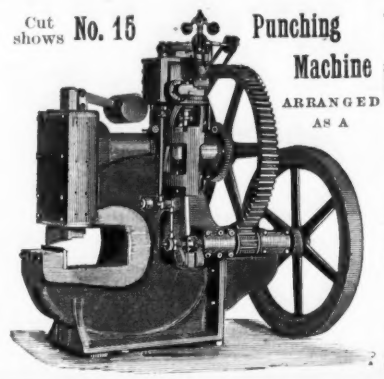

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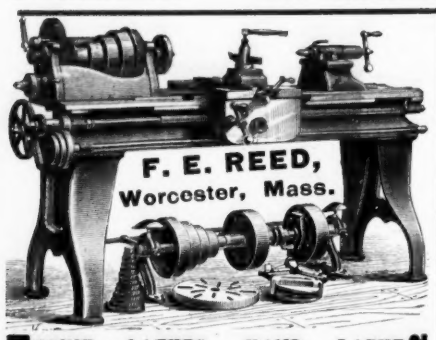

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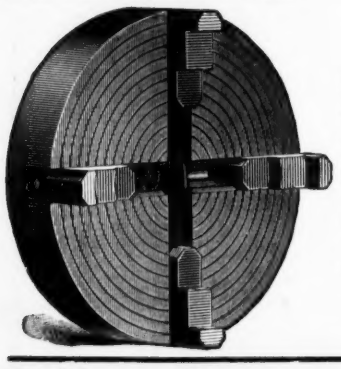

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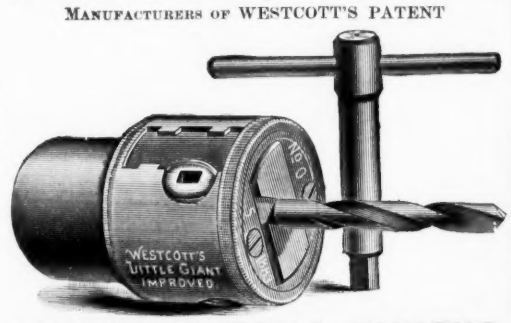

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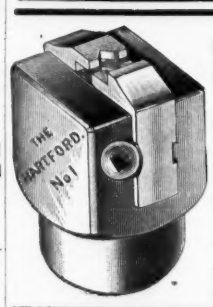

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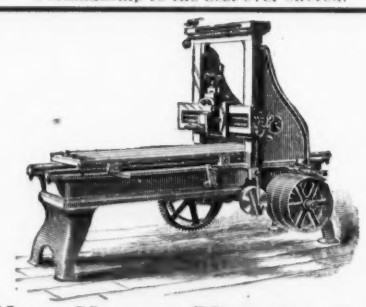

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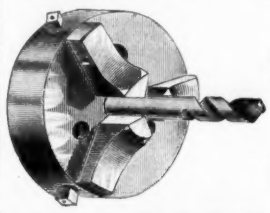

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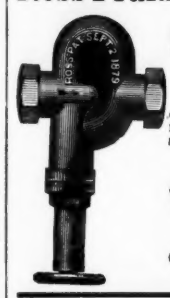

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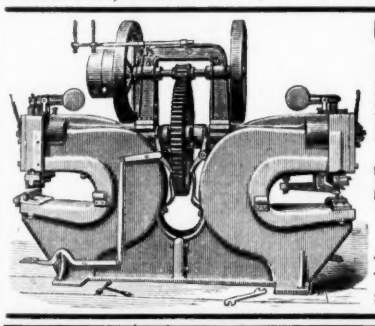

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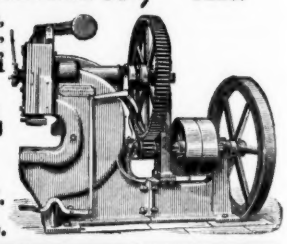

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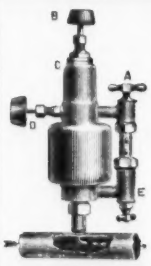

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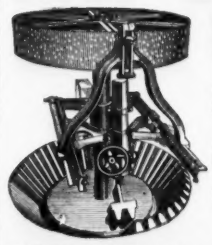

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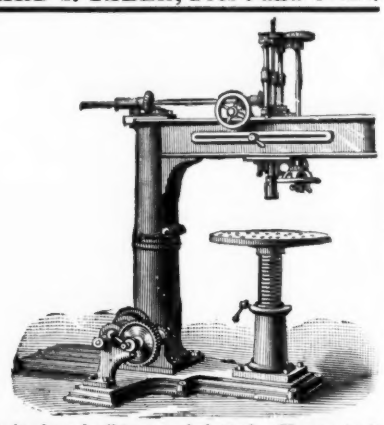

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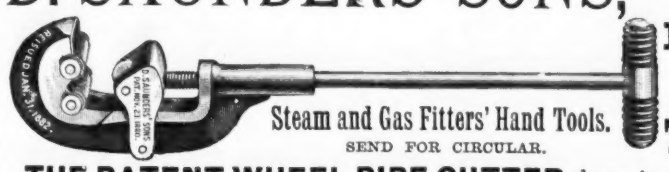

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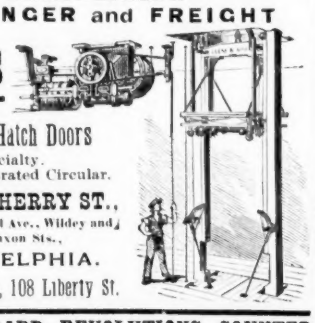

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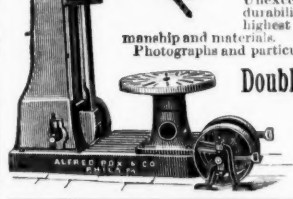

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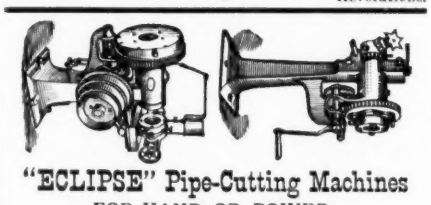

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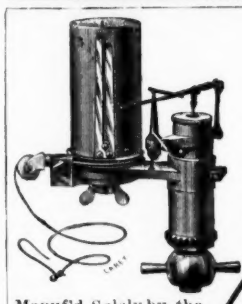

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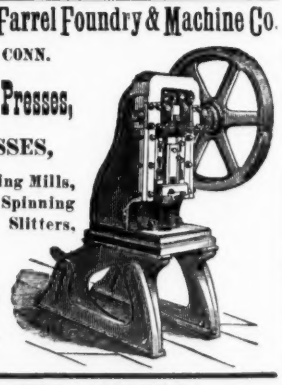

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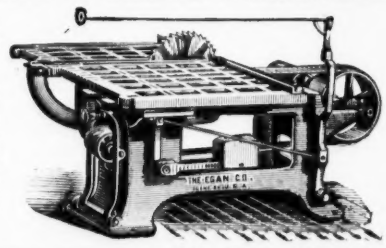

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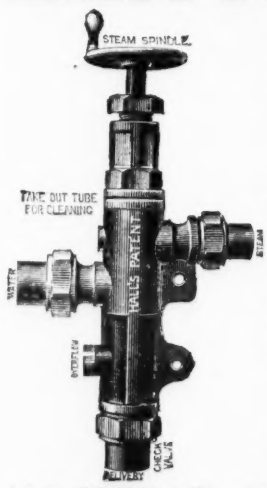

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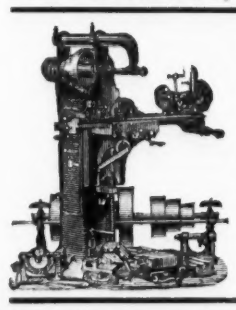

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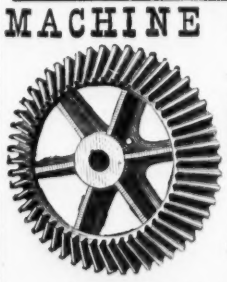

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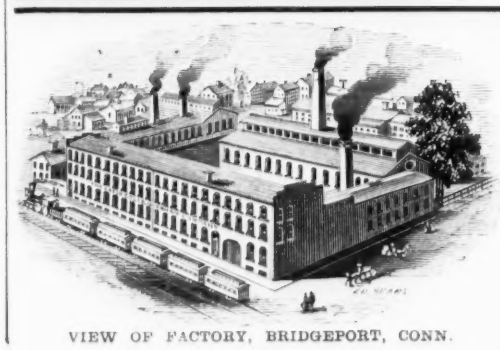

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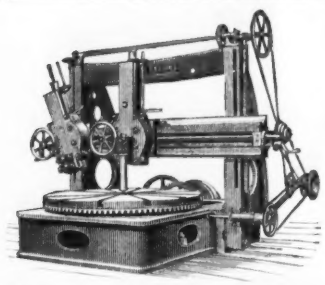

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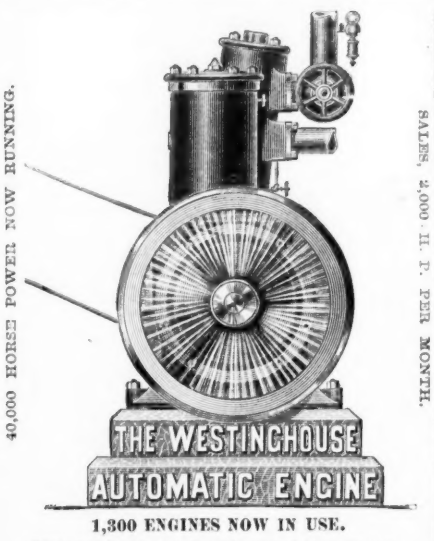

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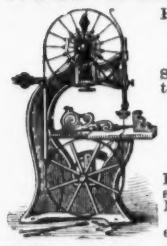

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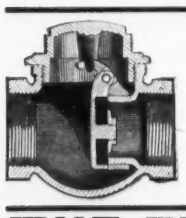

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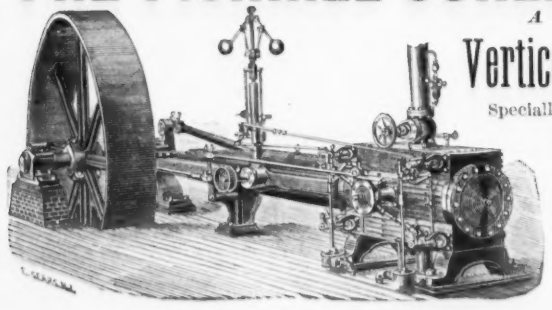

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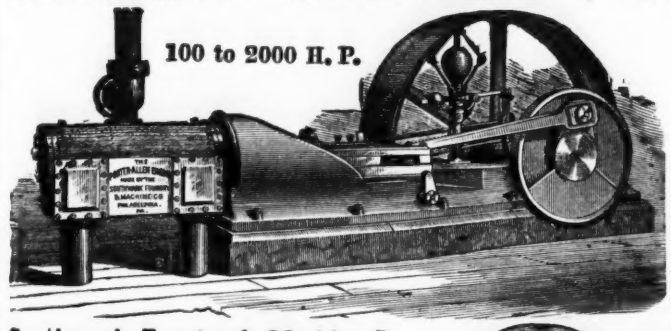

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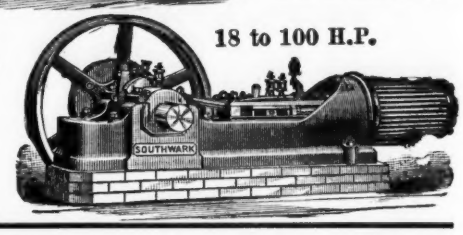

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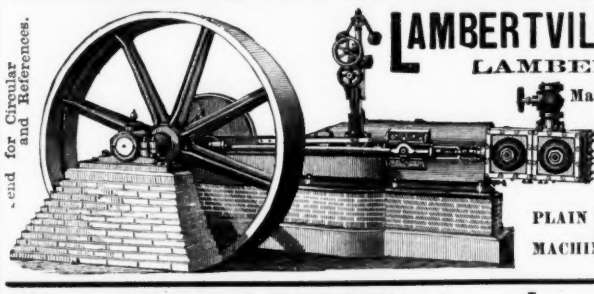

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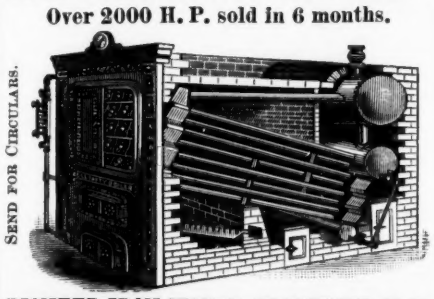

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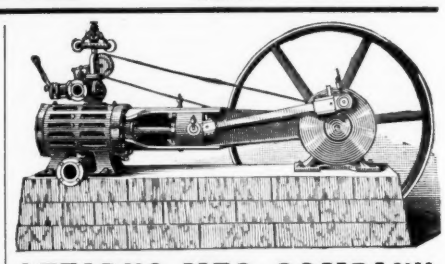

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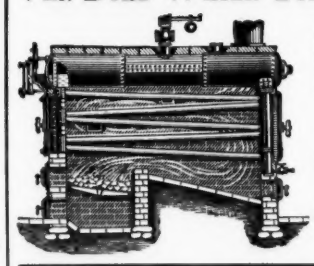

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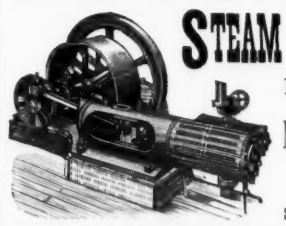

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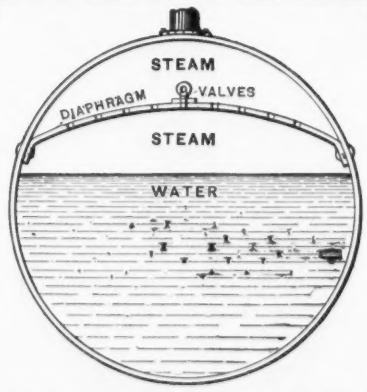

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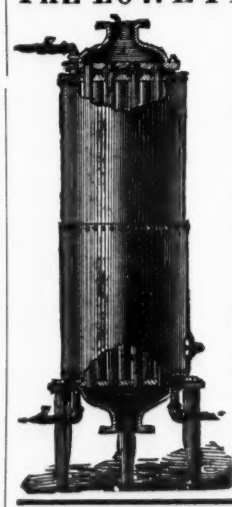

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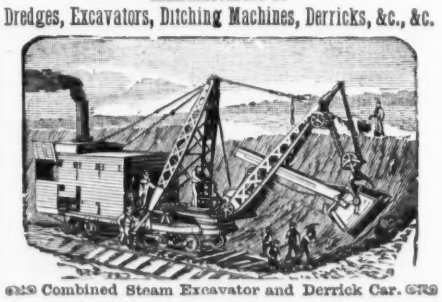

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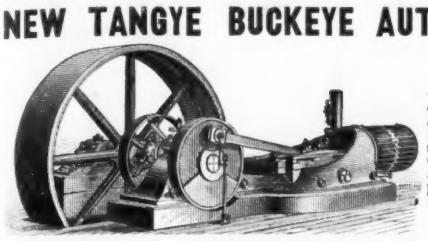

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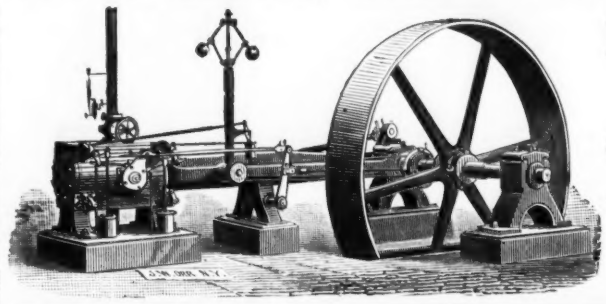

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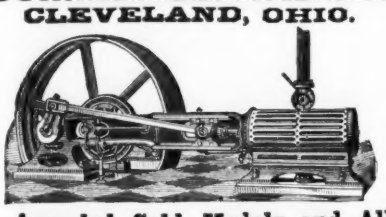

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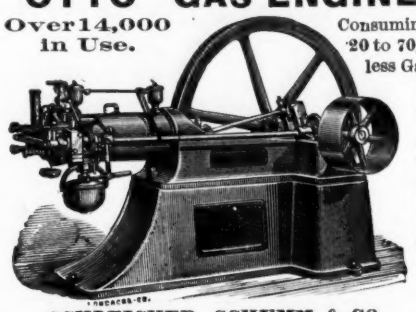

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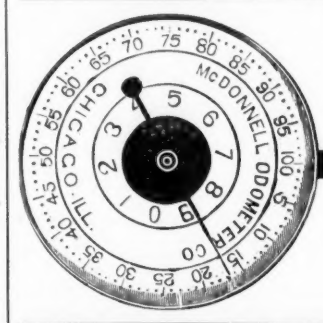

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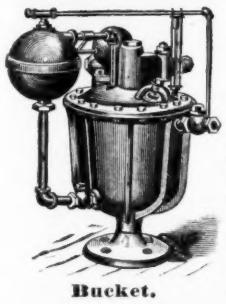

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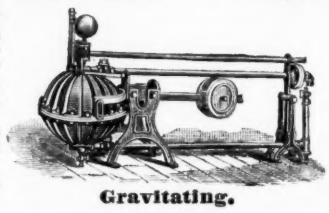

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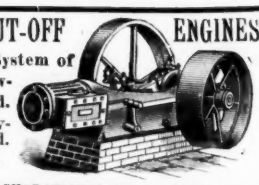

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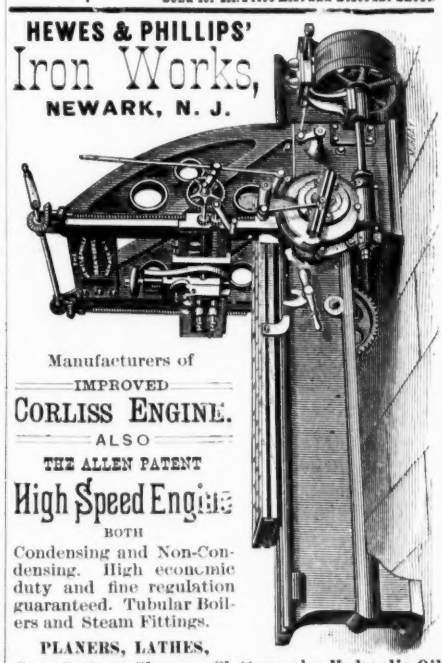

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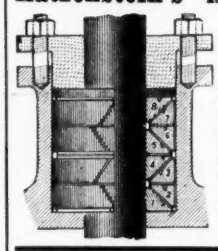

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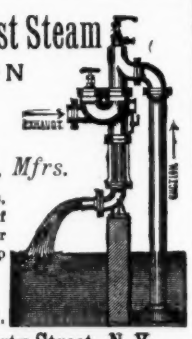

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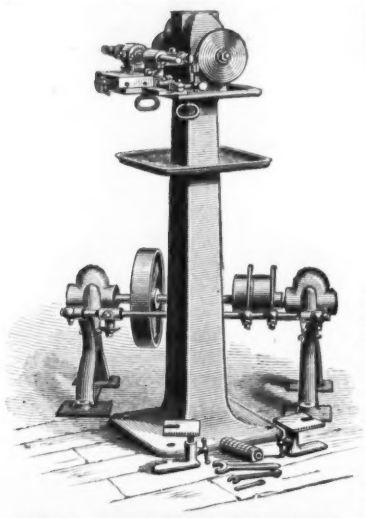

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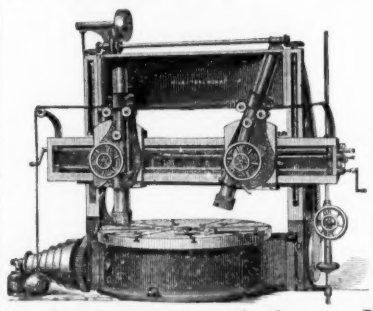

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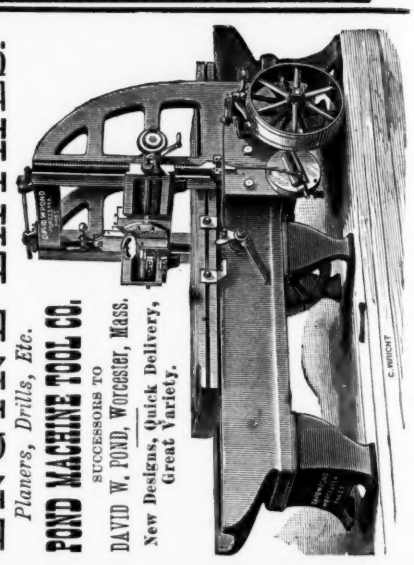

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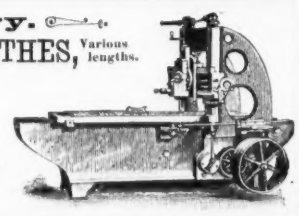

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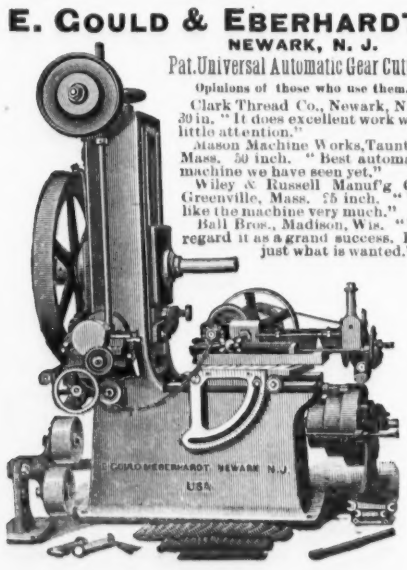

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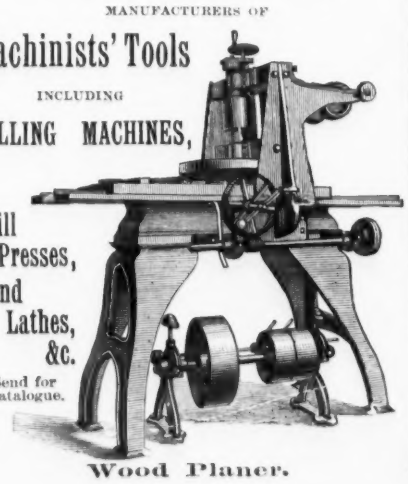

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